NATIONAL MUSEUM OF VICTORIA

Vol. XXIII. Part 8.

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The Journal of the Department of Agriculture of Victoria, Australia.

August, 1925.

PRINCIPAL CONTENTS

Faulty Separating

Crop and Fallow Competitions

Lucerne Top-Dressing Experiments

Poultry Feeding Experiments

Potato Experiments

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THE JOURNAL

OF

THE DEPARTMENT OF AGRICULTURE,

VICTORIA, AUSTRALIA.

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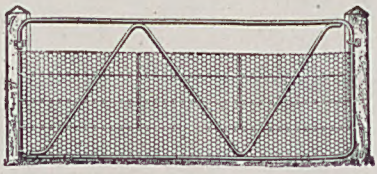

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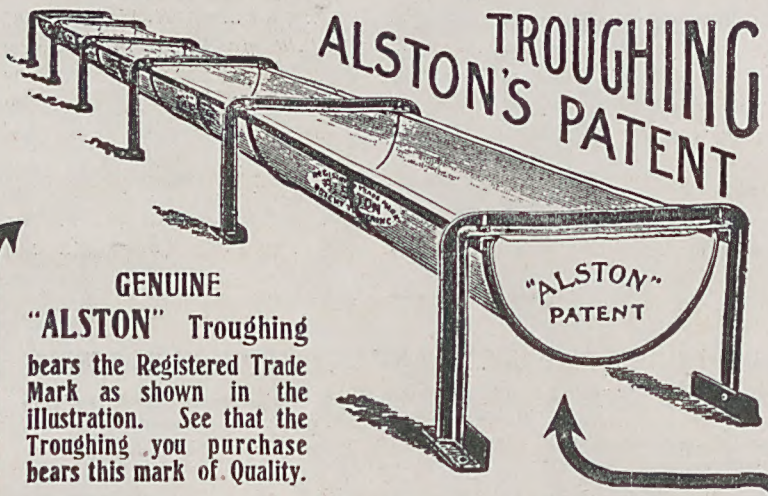

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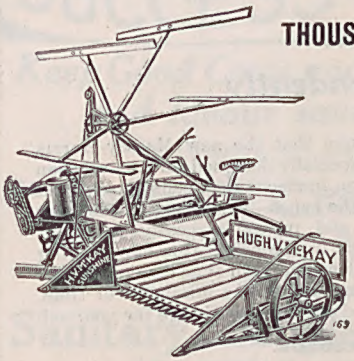

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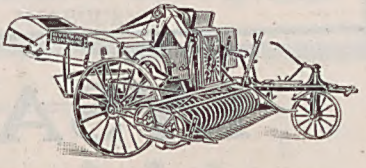

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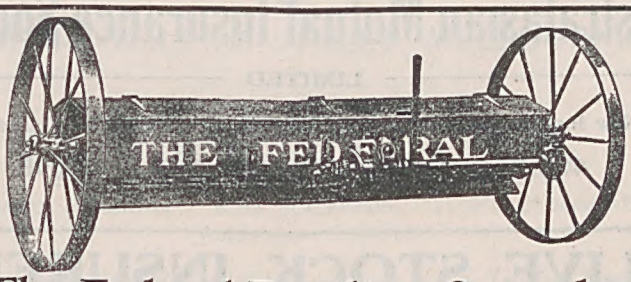

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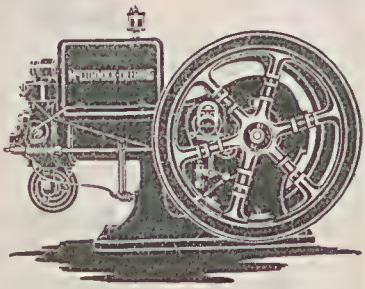

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VICTORIA.

Vol. XXIII. August, 1925. Part 8.

FAULTY SEPARATING.

A SOURCE OF HEAVY AND UNSUSPECTED LOSS.

By A. J. Gill and W. J. Yuill, Senior Dairy Supervisors.

Some years ago the Chief Veterinary Inspector of the Department of Agriculture expressed the opinion that a considerable loss was being incurred yearly on many farms, owing to faulty and careless separating, and during the tours of the Better Farming Train a few months since he made a special point of having a test made with a sample of separated milk from one of the dairy farms in each district visited. The result not only gave confirmation to Dr. Robertson's opinion, but surprised and startled officials and farmers alike.

On the last tour of the train it was found that only one of the machines, the results of which were tested, was doing satisfactory work. The worst sample showed that the loss of butter-fat was 1.1 per cent. If the test of the milk from which this sample had been taken were 4.4 per cent. (a test above the average) it would mean that exactly one-quarter of the butter-fat was being thrown to the pigs. Or to put it in another way—had the herd consisted of twenty cows, then the total butter-fat from five of them was being lost. As a matter of fact the number of cows in the herd was fifteen. If we suppose each cow was yielding butter-fat to the value of 10s. weekly, the total loss sustained each week was £2 10s. or about £130 per annum.

In testing separated milk it is difficult to get the whole of the fat to show; consequently the results are usually even higher than are displayed by the test-flasks. All the same, the average of the skim-milk samples taken during the last Better Farming Train tour was .246 per cent. If we assume that the average loss for the whole State be just one-half of this, or .123 per cent., and that the annual value of the butter produced be £5,000,000, we may set down the yearly loss for Victoria due to faulty separating at £6,150. This we consider a low estimate.

Some Reasons for Loss.

Without suspecting it, many a farmer throughout the State has been suffering the worn or the ill-adjusted separator to exact a heavy toll, and with butter-fat values at present rates it is essential that every chance of loss be reduced to a minimum. The separator should be "tested" as well as the cows. A machine that leaves more than .02 per cent. butter fat in the skim milk may be classed as defective. In many instances the trouble is easily remediable. The failure of a separator to secure the maximum amount of butter-fat from the milk may be due to—

Vibration and rocking, usually due to the machine not being set level and firmly.

A badly balanced bowl; a weak or broken crown spring; or in the swinging bowl type to the tension strings not being kept taut.

Worn cogs which occasionally slip.

In the disc type of separator the spacing checks between the discs may wear down and allow too much room, often requiring several new discs (or patties). If the best results are to be obtained, there should be no rattling or movement of the discs within when the bowl is put together and screwed tight. The addition of a few new discs will sometimes reduce the loss of butter-fat very considerably. In one instance that came under our notice, the loss was in this way reduced from .1 to .01 per cent.

Probably one of the greatest causes of loss of butter-fat is separating the milk at too low a temperature. An experiment where the morning milk was heated to 95°F, and the evening milk separated at whatever temperature it was when brought from the yard gave the following results:—

Table I.—Results obtained by Separating (1) Cold Milk and (2) Milk at a Temperature of 95°.

Skim test of evening milk (cold) .11.
Skim test of morning milk (95°) .03.

In Bulletin No. 52, Dairy Farming in Victoria, Mr. R. T. Archer, Senior Dairy Inspector, gives some figures of other experiments, which emphasize the necessity of warming the milk to approximately that of the body temperature of the cow. The figures in Table II. are taken from the bulletin referred to.

Table II.—Results obtained by Separating Milk at (1) 90°, (2) 75°, and (3) 60°.

Temperature of Milk.	Loss of Butter-Fat in Skim Milk.
90° F.	·022 per cent.
75° F.	·051 per cent.
60° F.	·120 per cent.

Turning the separator at a slower rate than specified in the instructions given by the maker will also cause a loss of butter-fat in the skim milk. Figures given by Mr. Archer in the bulletin on Dairy Farming in Victoria indicate that increased speed, unless at a very high rate, does not cause any loss of butter-fat in the skim milk, but slower turning results in a loss as shown under.

Table III.—Results obtained from Turning Separator Crank at (1) Normal Speed, (2) Speed Above Normal, and (3) Speed Below Normal.

Turns of Crank per Minute.	Test of Skim Milk.
10 too high	·029 per cent.
Normal	·029 per cent.
10 too low	·120 per cent.
20 too low	·210 per cent.

There is usually a greater loss in the autumn when milk is more viscous and contains a higher percentage of butter-fat. The addition of a bucket of warm water to 10 or 12 gallons of milk will decrease this condition, and will improve the skimming.

Skim Testing Work.

Many dairy farmers are not familiar with the terms commonly in use in connexion with milk-testing work. In what follows we have endeavoured to make our statement as clear as we can.

A skim test reading of .02 per cent. butter-fat means 2-100ths of a lb. of butter-fat in 100 lb. of skim milk (10 gallons). In other words, for every 10 gallons that flow through the separator when the skim test is .02 per cent., 2-100ths of a lb. of butter-fat is lost in the skim milk.

This seems a very trifling amount, but even at this minimum the year's aggregate loss is considerable. In an average dairy herd of 30 cows, averaging 5,000 lb. of milk per annum, the value of the butter-fat lost in the skim milk for the year will be as follows:—

Table IV.—Loss sustained by using a Separator with a Skim Milk Test of .02 Per Cent.

Lbs. of Milk.	Skim.	Per Cow.	Cows in Herd.	Aggregate Loss.	Value at 1s. 6d. lb.
$\frac{5{,}000}{1}$	$\times \frac{2}{100}$	= 1 lb. butter-fat	× 30	= 30 lb. butter-fat	= £2 5s.

Many separators will probably be found to be skimming between .03 and .1 per cent. If we suppose the average to be .05 per cent., and the price of butter-fat to be 1s. 6d. lb., the loss would be as shown below.

Table V.—Loss sustained by using a Separator with a Skim Milk Test of .05 Per Cent.

Lbs. of Milk.	Skim.	Per Cow.	Cows in Herd.	Aggregate Loss.	Monetary Loss for year.
$\frac{5{,}000}{1} \times \frac{5}{100}$				= 2·5 × 30 = 75 lb. butter-fat, at 1s. 6d.,	= £5 12s. 6d.

Many dairy herds in Victoria number from 50 to 100 head of milking cows. It will readily be seen that a very substantial loss may occur where large herds are being milked, and that the loss would be proportionately greater where the percentage of butter-fat in the skim milk is increased, or where the average milk yield per cow is higher.

Where the practice of separating the milk, without first heating it to 90 deg. F. is in operation, the skim milk test is not likely to be below .1 per cent. In the case of a herd of 50 cows averaging 5,000 lb. of milk, the annual loss would be as shown.

Table VI.—Loss sustained by using a Separator with a Skim Milk Test of .1 Per Cent.

Lbs. Milk.	Skim.	Per Cow. Loss.	Cows in Herd.	Yearly Loss Butter-fat.	Monetary Loss.
$\frac{5{,}000}{1} \times \frac{1}{100}$		= 5·0 lb. butter-fat,	× 50	= 250 lb. butter-fat, at 1s. 6d. lb.	= £18 15s.

It will thus be seen that a faulty separator, or faulty methods can be the means of losing more butter-fat in a season than a good cow can produce in the same period.

Since the advent of the District Herd Testing Association movement many dairy farmers have their separators tested regularly, and some surprising results have been disclosed. Some have been found to be losing up to and over 1 per cent. of butter-fat in the skim milk—a loss of 1 lb. of butter-fat in 10 gallons of milk. This would be equivalent to a loss of 50 lb. butter-fat in the case of a cow producing 5,000 lb. of milk in a year.

In an instance that came under notice a test revealed that the loss of butter-fat was 1.2 per cent. By overhauling the machine the loss was reduced to .8 per cent., and later to .6 per cent. As this seemed to be the best that could be done, the purchase of a new separator was decided upon, but not probably before double its price has been lost.

The sceptical man when reading of these things will say that any dairyman should be able to tell when the separator is working badly by the amount of cream appearing on the skimmed milk. However, in practice it is usually fed direct to the pigs and calves, and even when left standing for some time, it might be that the amount of cream showing would not arouse his suspicion as to what the total loss would amount to in a few weeks' time. If he does happen to notice some cream on the skim milk he may remark that he will get it back in pork. Now, it takes approximately 30 lb. of skim milk to make 1 lb. of pork. The skim milk is valuable chiefly because of the protein contained in the casein or curds. Butter-fat supplies carbo-hydrates, i.e., energy and heat forming substances, and these can be supplied

by grains costing only 1d. a lb., while butter-fat costs 1s. 6d. a lb. As the value of 1 lb. of butter-fat (1s. 6d.) would purchase 18 lb. of grain, which would produce 3 lb. of pork worth 9d. a lb., or a total of 2s. 3d., it will be seen that to feed pigs on butter-fat would quickly result in a serious loss.

The majority of dairymen affirm that they can tell when the separator is running correctly from the hum of the machine, yet the watch will often reveal that the speed is several revolutions slower than that required.

Power separators are usually credited with even running; this is generally admitted; yet it is quite possible for an apparently smooth-running power separator to be losing a considerable amount of butter-fat as the following figures show:—

TABLE VII.—LOSSES DUE TO THE UNEVEN RUNNING OF A POWER SEPARATOR.

No. 1 Herd.—Good Skimming.		No. 2 Herd.—Faulty Skimming.	
Month.	Skim Test.	Cows Milked.	Skim Test.
September	·015 per cent.		
October	·02 per cent.	43 cows	·10 per cent.
November	·015 per cent.	72 cows	·09 per cent.
December	·02 per cent.		
February	·04 per cent.	83 cows	·07 per cent.
March	·035 per cent.		
April	·045 per cent.	23 cows	·14 per cent.

In a herd of 72 cows, averaging 25 lb. of milk daily, with skim test of .09 per cent., a loss of 11⅛ lbs. butter-fat would result per week, or a monetary loss of 17s.

Considerable fluctuation likewise occurs owing to the uneven running of hand separators, as the figures in Table VIII. show.

TABLE VIII.—LOSSES DUE TO THE UNEVEN RUNNING OF A HAND SEPARATOR.

No. 1.		No. 2.	
Month.	Skim Test.	Cows Milked.	Skim Test.
December	·37 per cent.	31 cows	·085 per cent.
January	·16 per cent.	31 cows	·14 per cent.
February	·12 per cent.	31 cows	·06 per cent.
March	·35 per cent.	30 cows	·05 per cent.

In a herd of 31 cows averaging 30 lb. of milk daily, with the skim test of .37 per cent., a loss of 24 lb. butter-fat, or, expressed in money terms, 37s. would result in a week. Recently a separator was found to be losing 1.3 per cent. butter-fat. As 50 gallons were being separated daily there was a weekly loss of 45 lb. butter-fat, or a cash loss of £3 8s. 3d.

The figures given in the first four columns of Table IX. are from the lists of four different District Herd Test Associations, and the test of the samples was in each instance made by the association's official tester. The figures in the fifth column of the table are from the records of tests made on the last tour of the Better Farming Train; the only test of those specified in the whole table that can be regarded as satisfactory is the one made during this tour in which the loss was only .02 per cent.

Table IX.—Showing Losses in Different Parts of the State by use of Defective Separators, as shown by lists of Herd Test Associations, etc.

No. 1 District.	No. 2 District.	No. 3 District.	No. 4 District.	Districts visited by Better Farming Train (Fifth Tour).
1·2 per cent. ..	1·3 per cent.	·55 per cent.	·16 per cent.	1·1 per cent.
·66 per cent. ..	·8 per cent.	·37 per cent.	·14 per cent.	·23 per cent.
·6 per cent. ..	·3 per cent.	·35 per cent.	·14 per cent.	·2 per cent.
·1 per cent. ..	·24 per cent.	·16 per cent.	·1 per cent.	·2 per cent.
·1 per cent. ..	·23 per cent.	·12 per cent.	·08 per cent.	·12 per cent.
·8 per cent. ..	·13 per cent.	·11 per cent.	·07 per cent.	·05 per cent.
·7 per cent. ..	·11 per cent.	·08 per cent.	·06 per cent.	·05 per cent.
				.02 per cent.

The figures given in Table X. will give some idea of how expensive bad skimming really is. Of 46 separators all giving a skim test of .05 per cent. and over, it was found that 24 were testing over .1 per cent., and a loss of .1 per cent. means that for every 10 gallons of milk passed through the separator one-tenth of a lb. of butter-fat was wasted. The table will, it is hoped, serve to impress on readers how serious is the loss of butter-fat as a result of bad methods or through the use of defective machines, for a mere glance at it will show the yearly butter-fat loss per cow, at varying percentages, and the annual cash loss in each cow. No. 1 class represents the average Victorian cow; No. 2, a good cow (many herds are now averaging 5,000 lb. of milk under average farm conditions); No. 3 represents the extra good class of cow, and No. 4 of the exceptional cow.

Table X.—Showing Annual Loss per Cow of different Classes as a result of using Defective Separators.

Skim Test.	No. 1 Class. Average, 3,500 lb. Milk.		No. 2 Class. Average, 5,000 lb. Milk.		No. 3 Class. Average, 7,000 lb. Milk.		No. 4 Class. Average 10,000 lb. Milk.	
Per Cent.	Lbs. Butter Fat.	Value, at 1s. 6d. per lb. s. d.	Lbs. Butter Fat.	Value, at 1s. 6d. per lb. s. d.	Lbs. Butter Fat.	Value, at 1s. 6d. per lb. s. d.	Lbs. Butter Fat.	Value, at 1s. 6d. per lb s. d.
·02.. ..	·70 =	1 1	1 =	1 6	1·40=	2 2	2 =	3 0
.05.. ..	1·75 =	2 7½	2.5 =	3 9	3.50=	5 3	5 =	7 6
.10.. ..	3·50 =	5 3	5 =	7 6	7.00=	10 6	10 =	15 0
.50.. ..	17·50 =	26 3	25 =	37 6	35 =	52 6	50 =	75 0
1.00.. ..	35·00 =	52 6	50 =	75 0	70 =	105 0	100 =	150 0

TABLE XI.—SHOWING THE MONETARY LOSS PER WEEK (ASSUMING BUTTER-FAT TO BE WORTH 1s. 6d. PER LB.) THAT WILL RESULT FROM USING DEFECTIVE SEPARATORS GIVING A SKIM TEST VARYING FROM 1 PER CENT. TO .01 PER CENT., WITH QUANTITIES OF MILK OF 10 GALLONS AND MULTIPLES OF 10 UP TO 100 GALLONS.

Skim Test.	Gallons of Milk Separated per Day.																											
	10 Gallons.			20 Gallons.			30 Gallons.			40 Gallons.			50 Gallons.			60 Gallons.			70 Gallons.			80 Gallons.			90 Gallons.			100 Gallons		
%	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.
1·00	0	10	6	1	1	0	1	11	6	2	2	0	2	12	6	3	3	0	3	13	6	4	4	0	4	14	6	5	5	0
·90	0	9	8	0	19	4	1	9	0	1	18	8	2	8	4	2	18	0	3	7	8	3	17	4	4	7	0	4	16	8
·80	0	8	5	0	16	10	1	5	3	1	13	8	2	2	1	2	10	6	2	18	11	3	7	4	3	15	9	4	4	2
·70	0	7	4	0	14	8	1	2	0	1	9	4	1	16	8	2	4	0	2	11	4	2	18	8	3	6	0	3	13	4
·60	0	6	3	0	12	6	0	18	9	1	5	0	1	11	3	1	17	6	2	3	9	2	10	0	2	16	3	3	2	6
·50	0	5	3	0	10	6	0	15	9	1	1	0	1	6	3	1	11	6	1	16	9	2	2	0	2	7	3	2	12	6
·40	0	4	2	0	8	4	0	12	6	0	16	8	1	0	10	1	5	0	1	9	2	1	13	4	1	17	6	2	1	8
·30	0	3	2	0	6	4	0	9	6	0	12	8	0	15	10	0	19	0	1	2	2	1	5	4	1	8	6	1	11	8
·20	0	2	1	0	4	2	0	6	3	0	8	4	0	10	5	0	12	6	0	14	7	0	16	8	0	18	9	1	0	10
·10	0	1	0½	0	2	1	0	3	1½	0	4	2	0	5	2½	0	6	3	0	7	3½	0	8	4	0	9	4½	0	10	5
·09	0	0	11	0	1	10	0	2	9	0	3	8	0	4	7	0	5	6	0	6	5	0	7	4	0	8	3	0	9	2
·08	0	0	10½	0	1	9	0	1	7½	0	3	6	0	4	4½	0	5	3	0	6	1½	0	7	0	0	7	10½	0	8	9
·07	0	0	9	0	1	6	0	2	3	0	3	0	0	3	9	0	4	6	0	5	3	0	6	0	0	6	9	0	7	6
·06	0	0	7½	0	1	3	0	1	10½	0	2	6	0	3	1½	0	3	9	0	4	4½	0	5	0	0	5	7½	0	6	3
·05	0	0	6	0	1	0	0	1	6	0	2	0	0	2	6	0	3	0	0	3	6	0	4	0	0	4	6	0	5	0
·04	0	0	5	0	0	10	0	1	3	0	1	8	0	2	1	0	2	6	0	2	11	0	3	4	0	3	9	0	4	2
·03	0	0	4	0	0	8	0	1	0	0	1	4	0	1	8	0	2	0	0	2	4	0	2	8	0	3	0	0	3	4
·02	0	0	2½	0	0	5	0	0	7½	0	0	10	0	1	0½	0	1	3	0	1	5½	0	1	8	0	1	10½	0	2	1
·01	0	0	1½	0	0	2½	0	0	3¾	0	0	5	0	0	6¼	0	0	7½	0	0	8¾	0	0	10	0	0	11¼	0	1	0¼

What to do to Avoid Bad Skimming.

Test the skim milk periodically.

Be sure that the temperature of the milk is not below 90 deg. at time of separating.

Make certain that the number of revolutions per minute of the separator crank does not fall below the number specified in the instructions received with the separator.

If there be vibration, ascertain the cause. The machine may not be set firm and level. The crown spring may need renewing. Some of the points may be badly worn; worn points make the machine handle difficult to turn; this tends to reduce the number of revolutions per minute, which brings about faulty skimming.

Always wash the separator after use; a dirty separator can hardly be expected to skim clean.

Add new discs when necessary.

Oil all bearings and working parts regularly and carefully.

How to take a Sample of Skim Milk for the Test.

As separators do not always run evenly throughout the skimming operation, it is essential that a representative sample be obtained; therefore, several samples should be taken at intervals while the machine is running. These should be thoroughly mixed and a sample for testing taken immediately.

If the test reveals that a percentage of butter-fat is being lost a reference to Table XI. will quickly disclose whether the loss is one of pence or pounds. Even if it is but one entailing a small loss, an endeavour should be made to remove the cause, for as the old proverb has it, "Look after the pence and the pounds will take care of themselves."

NUMURKAH FALLOW COMPETITION, 1925.

Report of the Judge, H. A. Mullett, B. Ag. Sc., Senior Inspector of Agriculture.

Any one who makes a systematic inspection of the soils of the Numurkah district, as a judge of a fallow competition has a unique opportunity for doing, cannot fail to be impressed with their fertility and general suitability for the production of heavy wheat crops. But that is not to say maximum crops can be grown on them without the employment of the highest skill, though it implies that fairly good crops can be raised without a great deal of trouble. Numurkah farmers to-day require something better than ordinary crops; that is why the agricultural society has organized this competition.

Good as they are, the soils have their peculiarities which must be studied and coped with if the highest yields are to be obtained. The rainfall—17 inches annually—is abundant enough for the heaviest crops if properly utilized, but as much as possible of that which falls on the fallow requires to be conserved for the growing crop. Unless the fallow is carefully prepared and scientifically mulched this cannot be done effectively.

But a well-tilled fallow, highly charged with moisture, is not in itself sufficient. The most prolific varieties of wheat of pedigree strain available must be sown, and every effort made to secure a good germination. Due precaution must be taken to forestall diseases such as bunt, rank growth has to be guarded against, and crops free from weeds raised. When all of these things have been attended to, then and then only can the wheat-grower feel satisfied that he has done all in his power to raise the biggest crop.

Fallowing.

Bare fallow is fundamental for high yields at Numurkah, though it would be idle to say that some good non-fallow crops have not been grown, yet the practice savours more of gambling than safe farming, because the result is uncertain; while it is bad farming, because it leads to the fouling of the land by weeds, and diseases such as takeall, and it tends to prolong the seeding season unduly in a district where early sowing produces rank crops and where late sowing is not satisfactory.

Land ploughed between harvest and seed time makes first class fallow for next year, but if sown immediately it generally gives a second class crop. It pays to fallow early, as tests at Rutherglen State Farm extending over the past eight years have conclusively shown.

Results of Eight Years' Tests with Wheat, Rutherglen State Farm.

	Average Eight Years.
Ploughed July, 5 inches, and cultivated ..	22.5 bushels per acre.
Ploughed October, 5 inches, and cultivated ..	17.7 bushels per acre.

The experiment, which was conducted on plots each quarter acre in area, thus indicates that the July fallow yielded on the average 4.8 bushels per acre more than October fallow.

The lesson is obvious. The earlier the fallow, the less rain "runs off" the paddocks, and the sooner the mulch of loose soil can be placed in position to trap the moisture.

The depth to which the ploughing is done should be carefully regulated. On loose soils, such as are some of the deepest and richest in Numurkah, it is probable that the best results are to be obtained by shallow work—say, 3½ to 4 inches—no deeper. This would have the effect of more readily promoting the consolidation so essential for wheat. On the other hand, it is probable that for the clay loams, which comprise the majority of the soils, 5 inches should be the depth to be aimed at, provided no subsoil is brought to the surface. Five inches is the depth which most wheat-growers in the Goulburn Valley have aimed at for many years, though recently the success of the shallower ploughing in the Wimmera has led some to reduce it.

The experiments at Rutherglen on a clay loam show very conclusively that the best results in that district are obtained from deep ploughing. It may be the same at Numurkah.

Depth of Ploughing Test at Rutherglen—Eight Years.

3 inches deep ..	.. 16.9 bushels per acre.
5 inches deep ..	.. 20.9 bushels per acre.
7 inches deep ..	.. 22.5 bushels per acre.
9 inches deep ..	.. 22.1 bushels per acre.

Five-inch ploughing is obviously much more profitable than shallower work. Depths greater than that increase the draught unduly. Subsequent to ploughing the mulch should be placed in position as soon as possible. On soils similar to much of that at Numurkah the mouldboards turn well-defined sods; these must be broken with the harrows. Later, weeds make their appearance and necessitate "sheeping," and later on cultivation. The first cultivation should be deep, but after that no deeper than 2½ inches. On land liable to set, a coarse, nubby tilth should be secured in order to avoid a flat surface which skins over badly. A set mulch is one from which soil water escapes most readily, and is very difficult to work up with any implement but the disc cultivator, which produces a very fine tilth—the condition most susceptible to being beaten down flat by rain. Where possible, the spring-toothed cultivator, the rigid-tined cultivator and the Wimmera scarifier are to be preferred to the disc, which, of course, has its special uses.

Tests made at Rutherglen indicate that in well-tilled fallow up to 4 inches more rain can be conserved in a year than in neglected fallow; and that this is responsible for better yields is revealed in the following table:—

	Average for Five Years.
Ploughed 5 inches deep in July, and well worked	24.66 bush. per acre.
Ploughed 5 inches deep in July, and neglected ..	14.23 bush. per acre.
Increase due to careful mulching	10.43 bushels per acre.

Considerations such as these were taken into account when judging the fallows. The wet summer to some extent rendered the work of judging difficult, because some of the fallows were charged with moisture not necessarily retained there by the exercise of judgment and skill. The task of separating four or five of the best fallows was not an easy

one. All were excellent, and in the end minor points had to be used to make distinctions.

The number of entries (nineteen) and the general keenness of the competition reflects great credit on both the competitors and the society.

Awards.

P. Tweddle	97 points	First.
A. L. Young, No. 2	96 points	Second.
J. N. T. Fowler, No. 2	95 points	Third.
D. W. Bitcom	95 points	
J. Mortimer	95 points	

The winding fallow was highly charged with moisture; the mulch was just cloddy enough to prevent undue skinning over; there was a total absence of weeds, and an inspection showed that the cultivation had been thorough and regular. The soil under the mulch was hard and level.

The paddock, grey clay loam with reddish banks, was ploughed early in June, and harrowed immediately after each day's ploughing. The harrowing was repeated at the end of July. Late in September the fallow was disced, and at the end of October spring-toothed. In March the red soil was spring-toothed, and the grey scarified with an old-type scarifier. All the operations were conducted after rain. The quick harrowing after each day's ploughing was undoubtedly one of the most effective operations given this paddock.

Mr. A. L. Young's fallow also contained a high percentage of moisture, was effectively mulched, and the cultivation was thorough, though the "bottom" was somewhat ridged. The paddock was fallowed with a mouldboard plough in August to 4 inches deep. In October a stroke of the harrows was given, and in November the disc was used. Weeds were cut with a rigid-tined cultivator in January, and this was followed by the harrows in February. In March the land was worked up for seeding with the rigid-tined cultivator, and this operation was followed by the harrows.

Mr. J. N. T. Fowler's fallow was ploughed in August, and harrowed immediately after. In November the disc cultivator was put over the field, and in February the spring-tooth; this latter operation was repeated at the end of March. The paddock was a fertile deep red clay loam.

Mr. D. W. Bitcom showed a paddock of strong brown clay loam. The moisture content was the highest of any inspected. The mulch was very cloddy, as is fitting for soil of this class, but was somewhat shallower in parts than appeared to be desirable. The paddock was ploughed in July and August to 4 inches deep, and then harrowed twice. During October two strokes of the spring-toothed cultivator were given. Early in November the paddock was harrowed, in mid-November the spring-tooth was used to loosen up the ground, also in January and again in April. The fallow had undoubtedly been prepared with great skill.

Mr. J. Mortimer's fallow was an attractive one. The soil was a first class pine-country sandy loam, with a good clay at 6 or 7 inches. The moisture content appeared to be a little lower than that of the

first few fallows, and the mulch was thought to be rather shallow and fine.

The paddock was ploughed in June and July to 4½ inches deep, and harrowed at the same time. In early September a second harrowing was given. On 17th September a spring-toothed cultivator with 6-inch tips for weed cutting was put through the field, and again in October. In February the same implement was used with narrow tips.

Details of Award.

Name.	Soil Type.	Moisture.	Mulch.	Weeds.	Cultivation.	Total.
Maximum points ..	.. .. ..	**25**	**25**	**25**	**25**	**100**
P. Tweddle ..	Grey clay loam, red loam banks	24	24	25	24	97
A. L. Young (No. 2)	Red loam (pine) ..	24	24	25	23	96
J. N. T. Fowler (No. 2)	Red loam ..	23	24	24	24	95
D. W. Bitcom ..	Strong brown clay loam	25	23	24	23	95
J. Mortimer ..	Sandy loam over good clay (pine)	23	23	25	24	95
A. L. Young (No. 1)	Red loam ..	23	24	24	23	94
D. Cowan ..	Red loam over red clay	21	24	25	23	93
Hodge Bros.	Dark brown loam, with buckshot	22	23	24	23	92
G. H. Close ..	Grey loam over clay	23	23	22	24	92
Allen & Wood ..	Brown loam ..	18	24	25	23	90
R. Adam ..	Red sandy loam ..	22	23	21	24	90
A. Tweddle ..	Red clay loam ..	21	22	25	21	89
J. N. T. Fowler (No. 1)	Red loam ..	22	21	23	22	88
Christie & Hay ..	Heavy grey loamy flat, with red loam bank	22	20	23	20	85
D. F. Rendell ..	Red loam over good red clay	21	20	21	22	84
M. Hansen ..	Red loam ..	20	22	22	20	84
W. L. Moss ..	Red sandy loam ..	19	20	23	22	84
R. C. Gordon ..	Strong clay loam	20	20	22	20	82
W. C. H. Tyack ..	Red sandy loam, undulating pine country	19	19	20	20	78

It should be pointed out that the details of cultivation methods furnished have in no way been taken into account in making the awards. Each fallow was judged entirely on its appearance in the field.

The scale of points is framed by the society to encourage good farming, and the most points have been awarded to the fallow considered to have been farmed best according to the class to which the soil belongs. Under this system a soil of low fertility has an equal chance with a rich one. This, and the fact that the time of sowing, the variety and manure used influence the yield, should be taken into account by all who compare the yields next harvest time.

In conclusion, I desire to thank the president of the society, Mr. J. Christie, the secretary, Mr. Geo. Fowler, and others for the courtesy extended to me during the visit.

NATHALIA FALLOW COMPETITION.

Report of the Judge, H. A. Mullett, B. Ag. Sc., Senior Inspector of Agriculture.

At Nathalia there has recently developed a strong feeling that it would be possible to grow more profitable wheat crops there if better methods were adopted. The object of the local agricultural society in conducting Crop and Fallow Competitions is to have a careful examination made of the fallowing methods, and, later, of the crops raised, with a view of giving publicity to the procedure by which the best crops are grown. Not only that, but the society believes, and with good reason, that the competitions will lead to the introduction of systems which have proved so valuable in other districts, and which may be capable of adaptation to Nathalia conditions.

An examination of the principal soils of the district discloses that there are a number of distinct types, each of which requires special treatment for the best results; thus no standardized fallowing method can be used for the whole district. Soils which are of a loose, loamy character, often of considerable depth, as occur in the direction of Numurkah, must be treated differently from the cementy red clay loams, of which there are considerable areas near the town; and these again are different from the grey crab-holey soils subject to inundation from the Goulburn.

On all the soils the first essential in their treatment is the conservation of moisture by means of early fallow, kept well mulched with loose earth throughout the season. On any of the loamy country, which does not run together when heavy rain falls, and on such of the grey soils as are friable, like those in the Wimmera, it is possible to reduce evaporation to a minimum, because a mulch of fine texture can be easily maintained throughout the year. On the other hand, the provision of a mulch as fine as this is undesirable on the cementy red clays, because of the ease with which it is run together by rain. Once the surface sets hard it evaporates moisture very readily, and is most difficult to break up again with any implement other than a disk cultivator, which chops it up finer than ever.

Such fallow must be left much more cloddy than one on the loamy soils, and while a cloddy mulch is not quite as effective in preventing evaporation as one of finer texture, it is infinitely better than a set one. Viewed in November, a paddock of well-worked fallow should show a mulch of from 2 to 2½ inches deep, and of a texture appropriate to the soil. The mulch should rest on a firmly consolidated seed-bed. Later on in the year, as seeding time is approaching, it will be rather shallower, owing to the tramping of sheep, and to general adherence of the loose soil to the solid layer below. A level seed-bed, rather than one rigid as sometimes seen, proves that the cultivation has been regular throughout the paddock, and indicates perfect tillage, which will be reflected in a high percentage of moisture saved, while the young seedlings will germinate evenly, and will make uniform growth everywhere.

The firm level seed-bed is easily attained on the clay soils, but is much more difficult to achieve on the deep sandy loams, the friable grey soil, and, of course, on any crab-holey paddocks. The latter can only be brought to a really satisfactory condition by gradually levelling them with implements of the "smoodger" type. On deep and loose loams, as far as possible, the use of the disk cultivator should be avoided, and the Wimmera scarifier or the rigid-tined cultivator substituted. Repeated working with implements of this type when the soil is moist, make it possible to pack the under layers together. The tramping of the horses and grazing by sheep also assist markedly. Wheat grown on such a seed-bed is far less liable to be killed by "take-all" than is a crop on soil kept deep and loose by a disk cultivator.

On some shallow clay soils of a very impervious nature it should be obvious that it is possible to pack the bottom too firmly, with the result that if heavy rains occur at seeding time there is a danger of the seed or the young plants becoming waterlogged. In these circumstances a deeper mulch than 2½ inches is permissible.

In respect to the depth of ploughing and the time of sowing, full information will be found in the report recently furnished the Numurkah Agricultural Society.*

Space does not permit a detailed description of the other principles involved in the production of wheat, but it will suffice for the present to state that the heaviest crops cannot be grown without liberal applications of seed and fertilizer, and the use of the most prolific varieties. Well-worked fallow contains more stored moisture and more plant food than neglected fallow, hence it is reasonable to suppose that it will support more plants to the acre, and these will require more superphosphate. At Nathalia at least 60 lb. of seed should be sown per acre at the start of the season, and the quantity should later be increased to 70 lb. per acre, with 75 lb. for late sowing.

The new copper carbonate process for dry pickling has proved most successful, and should be tested out. If carefully used it will be found to grow smut-free crops, with far less interference with germination than the ordinary pickles. A comprehensive account of the dry pickling process appeared in this journal for May last.

Awards.

Mr. J. Flanner's No. 2 entry, on reddish clay loam, was awarded 96 points, and first place; Mr. J. T. Crozier, grey lignum flat with red loamy rises, 95 points, second; and Mr. C. H. Dohnt, grey clay loam, 93 points, third. The first three fallows were summer fallow, and were all highly charged with moisture.

Mr. Flanner's paddock was ploughed in May to 4½ inches deep, then rolled and harrowed immediately. A month later it was harrowed at right angles, and in October disked and harrowed. In February it was disked and harrowed again, and finally rolled. May is, of course, late for summer fallow, but it should be remembered that had this paddock been sown in June (and many would have been tempted to do this), it would have yielded at best only a fair non-fallow crop, whereas it has made first class early fallow.

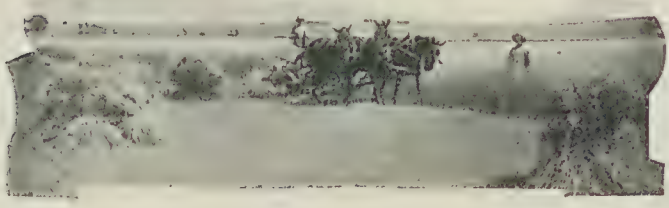
* See this issue, pages, 456–9.

Mr. J. T. Crozier's paddock was a very undulating one—a black lignum flat and red loamy rises. It is soil which can be worked to advantage after the Wimmera methods. The paddock was summer fallowed in March with a disk, and part with mouldboard plough. In June a spring-toothed cultivator was used, and in August the rigid-tined cultivator, which operation was repeated in September and November, and later in May. The moisture content was the highest of any fallow competing in the district; the mulch was fine, though rather shallow, and the seed-bed level and firmly consolidated.

Mr. C. H. Dohnt's paddock was grey crab-holey soil which had also been summer fallowed. It scored well in each subdivision for marks, and most points were lost because the rather shallow mulch had allowed the seed-bed to become cracked. The paddock was ploughed to 5 inches deep in April, and harrowed immediately. In September it was rigid-tined, and again in November and January. This paddock had therefore been worked on a system approximating closely to that used in the Wimmera, save that fewer operations were given.

Details of Award.

Competitor.	Soil Type.	Moisture.	Mulch.	Freedom from Weeds.	Cultivation.	Total.
Possible Points ..	.. ..	**25**	**25**	**25**	**25**	**100**
J. Flanner (No. 2) ..	Reddish clay loam	24	23	25	24	96
J. T. Crozier ..	Grey lignum flat, red loamy rises	25	22	23	24	94
C. H. Dohnt ..	Grey clay loam ..	23	23	25	22	93
J. Flanner (No. 1) ..	Friable grey loam	23	22	25	21	91
T. J. Thompson ...	Cementy red loam	20	20	24	21	85
B. F. Fearman (No. 1)	Clay loam ..	22	19	24	18	83
B. F. Fearman (No. 2)	Clay loam ..	22	17	24	20	83



YARRAWONGA FALLOW COMPETITION, 1925.

Report of the Judge, J. Brake, B. Ag. Sc., Chief Field Officer.

Although adversely affected to a certain extent by the torrential falls of rain in January, causing broken days and delayed harvesting, most of the fallows exhibited in the second fallow competition of the Yarrawonga and Border Pastoral and Agricultural Society were of a high standard.

Very few of the fallows were cultivated immediately after the heavy rains, and it was apparent that, by the consequent setting of the ground, a great deal of the moisture previously stored up had been lost, and also that much work was made necessary to bring the ground back ready for the drill. In this connexion it is most important that due recognition should be given to the great part which water plays in the production of the wheat crop. It is more important than superphosphate, and every effort should be made to prevent loss of moisture in any direction.

In low rainfall districts the limit in yield would be very small indeed if we had to depend solely on the rain falling during the growing period of the crop. Fortunately we are able to augment this amount considerably by storing up a large proportion of the previous year's rainfall in the soil by fallowing.

The effectiveness of a fallow lies very largely in the continuous preservation of a loose surface mulch; if the surface is allowed to set, especially during the hotter months, the stored water at once moves upward, to be evaporated away on reaching the surface.

The production of the crop must not be looked at in sections, but as a sequence of operations, all of which—ploughing, fallowing, seeding, and harvesting—are equally important in turn, and no one of which we can afford in any way to neglect or slum. The working of the fallow early in autumn may prevent the escape of an amount of moisture in the soil sufficient to give an increased yield of bags to the acre. Therefore, every endeavour should be made to preserve this loose mulch on the fallow continuously, so that the crop may not suffer as far as water is concerned.

In preparing soils which tend to run together after rain, it is necessary, of course, to prevent them as far as possible from becoming too fine. They should be worked with an implement which will not pulverize the soil, and generally it is wise to allow the fallow to remain fairly rough during the greater part of the fallowing season.

Of the nineteen fallows inspected, Mr. J. Sevenson's No. 1 paddock gained first place with 94 points, its merit lying in a 2½-inch mulch, even throughout, of very nice texture, a high moisture content, a complete absence of weeds, and good cultivation as evidenced by the level and evenly compacted seed bed, together with straight working and no missed land. This paddock was mouldboard ploughed to 4½ inches in July, then cross harrowed. It was then one-way disced to a depth of 3 inches in October and again in February, and finally crossed with the spring-tooth cultivator the first week in April. The soil was a

very even red loam, inclined to be sandy, with a firm, sandy subsoil overlying clay at a depth of 1 foot.

Mr. R. Lewington obtained second place with 90 points. His fallow was also of a very high standard, but appeared to have less moisture than the winning exhibit, whilst the seed bed, although firm, was a little irregular in character. It was mouldboard ploughed to 4½ inches in July and harrowed, and disced in September and again in March.

Mr. P. Connell's No. 4 and No. 3 entries, and Mr. A. McPherson's No. 3 followed with 88 points each. These were all well prepared, Mr. McPherson's being especially high in moisture. The latter fallow was mouldboard ploughed in August and cross harrowed, then scarified with the Sundigger crossways in September and lengthways in November, again lengthways in January, and finally disced in April. Apparently the January cultivation here was responsible for the high percentage of moisture.

Mr. Connell had prepared a nice mulch in both his paddocks, and both showed evidence of good even cultivation. All rubbish had been rooted out, but there were a fair number of bundles of dead weeds loose on the surface. In both paddocks the moisture appeared to be comparatively low.

The next three entries tied with 86 points each; they were those of Messrs. J. Johnstone and Short, Mr. A. McPherson's No. 2, and Mr. P. Connell's No. 1. All of these showed a lower moisture content, particularly that of Messrs. Johnstone and Short. This was a large paddock of 230 acres, and the moisture varied considerably in different parts, being higher on the half of the paddock which was worked in January with the Wimmera scarifier, and lower on the other half which was not worked until March with the disc.

Mr. A. McPherson's No. 1 paddock was ninth with 85 points. This fallow was in good order, but lost points mainly on account of growing thistles.

In Mr. J. McPherson's No. 1 entry the mulch was on the deep side, and the moisture was comparatively low. There were no growing weeds, but the cultivation just completed had apparently rooted out a great many green thistles.

The eastern side of Mr. Bott's paddock was well prepared, but on the western portion the implement last used had been allowed to merely scrape the surface; consequently points had to be deducted for both mulch and cultivation.

In Mr. J. McPherson's No. 2 entry the moisture was low, and there were weeds still standing in the paddock. The seed bed was somewhat irregular.

The remaining fallows judged lost points chiefly on the score of weeds and cultivation, but were, notwithstanding, in fair order. Two fallows had not been cultivated since last year, and it was impossible to allot points to them.

In conclusion, I wish to acknowledge the courtesy extended to me by the society when judging the fallows. Mr. Walker, the secretary, and Mr. Vagg, the president, assisted me in every way possible, the latter placing himself and his car at my disposal for the whole of the judging.

The allocation of points is as follows:—

Name.	Mulch.	Moisture.	Weeds.	Cultivation.	Total.
Possible Points	25	25	25	25	100
J. Stevenson (No. 1) ..	24	22	25	23	94
R. Lewington	23	20	25	22	90
P. Connell (No. 4) ..	23	19	23	23	88
P. Connell (No. 3) ..	23	18	24	23	88
A. McPherson (No. 3) ..	22	21	23	22	88
J. Johnstone & Short ..	22	20	21	23	86
A. McPherson (No. 2) ..	23	19	22	22	86
P. Connell (No. 1) ..	23	19	21	23	86
A. McPherson (No. 1) ..	23	21	19	22	85
J. McPherson (No. 1) ..	21	20	21	20	82
C. Bott	20	21	23	17	81
J. McPherson (No. 2) ..	22	19	19	20	80
P. Connell (No. 2) ..	18	20	22	18	78
J. Stevenson (No. 2) ..	19	21	15	20	75
J. Munro	21	20	15	19	75
J. Johnstone & Hay ..	20	19	16	18	73
J. Fraser	20	20	15	15	70

SHEPPARTON FALLOW COMPETITION, 1925.

Report by H. A. Mullett, Senior Inspector of Agriculture.

Owing to the abnormally heavy summer rains, the fallows throughout the Goulburn Valley were difficult to keep free of weeds, and hard to maintain in a satisfactory condition of tilth. The keen farmers time and again prepared an excellent mulch on their fallows, only to have it beaten down flat with heavy rain. Where a good harrowing in the Wimmera will suffice to keep the surface loose after it is beaten down by summer rains, a much heavier type of implement is often required in the Goulburn Valley because the soil sets so hard on drying. Thus, on the average, a summer working is more costly in the Valley than in the Wimmera, and as there is a very definite limit to the number of such operations that are likely to be profitable, a halt must be called with the summer workings in the Valley sooner than in the Wimmera.

This fact, in a large measure, has accounted for some of the competition fallows being shown in a set condition; and while it renders the work of judging more difficult, very little exception can be taken to the condition of some of the paddocks, in view of special circumstances. All of these fallows, however, had received reasonable cultivation earlier in the year, and hence held more moisture, contained more plant food, and were generally much more free from weeds than most of the fallows throughout the Valley.

The Awards.

Mr. J. Knox, Cosgrove, was awarded first prize; Mr. Jas. Tweddle, of Congupna, was second; then followed Mr. Jas. Phillips, Mr. Thos. Roe, and Messrs. Pogue & Sons, all equal.

The winner was awarded 94 points out of a possible 100. The paddock, a friable black clay loam, proved to be highly charged with moisture; the mulch of loose soil showed a rather ridged surface, and there were a few weeds present, otherwise it was in perfect condition. In particular, a well consolidated seed-bed was noticeable—so essential yet so difficult to achieve on this class of loose black soil. The following treatment was given by Mr. Knox:—Ploughed in August and early in September to 4½ inches deep; harrowed twice in September; scarified in October, and harrowed twice; scarified in November, and harrowed; and again scarified in January. A scarifier of the Wimmera type was used. This class of soil may be cultivated in accordance with Wimmera practice; but it is emphasized that such is not likely to be applicable to average Goulburn Valley soils, except, perhaps, those of a pronounced loamy character.

Mr. J. Tweddle was awarded 92 points. His land—a good red loan with a few grey patches—was ploughed during the latter end of June to from 4½ to 5 inches deep. In August it was harrowed, and in September disced and graded. At the end of October it was found necessary to use a spring-toothed cultivator, and early in December a scarifying with a Wimmera-type implement was given, followed by another spring-toothing during the middle of January. The moisture content proved rather lower than that of the winning fallow. The mulch was slightly set, weeds were almost absent, and the cultivation showed great regularity and evenness. Mr. Tweddle finds that the Wimmera scarifier can be used to supplement the disc cultivator on land of this class. He prefers the stump-jump scarifier, as this implement is of stronger construction and will also tear up harder soil than the fixed tined implement.

Mr. T. Roe (90 points) is another of those who are looking to the Wimmera scarifier to replace the disc cultivator for portion of the work on the fallow. He states that it cuts weeds better. His fallow—grey, with red patches—contained good supplies of moisture, though the mulch showed signs of having been ridged by the discs.

Details of Award.

Exhibitor.	Locality.	Soil.	Moisture.	Mulch.	Weeds.	Cultivation.	Total.
Possible Points ..	.. ..	.. ..	**25**	**25**	**25**	**25**	**100**
John Knox	Cosgrove	Black clay loam	25	23	22	24	94
Jas. Tweddle ..	Congupna	Red loam, grey patches	22	23	24	23	92
Jas. Phillips ..	Congupna	Red loam, grey patches	23	22	23	22	90
Pogue & Sons (No. 1)	Toolamba	Red clay loam	19	23	24	24	90
Thos. Roe ..	Congupna	Grey loam ..	22	23	23	22	90
Hugh Kerr (No. 1)	Kialla West	Red loam ..	17	20	24	20	81
Pogue & Sons (No. 2)	Toolamba	Red loam ..	18	19	21	21	79
H. Graham ..	Arcadia ..	Red loam ..	21	19	18	21	79
Hugh Kerr (No. 2)	Arcadia Homestead	Red loam ..	18	20	18	22	78

POTATO EXPERIMENTS, 1924-25.

RESULTS AT MILBROOK.

By J. T. Ramsay, Potato Expert.

The results obtained from the season's trials on the above experimental field are given hereunder.

The class of soil utilized is a rich red volcanic loam typical of a very large area in central Victoria, which has long been recognized as an excellent medium for the production of high quality potatoes, and of which there is annually employed an area totalling many thousands of acres for the growth of the State's potato requirements.

The season was moderately favorable, being one of lower mean temperature than usual, and there was an excess of moisture in the early stages. The resulting crop therefore shows nothing exceptional in the matter of gross weight, such as was obtained in the season 1923-24. It is, however, of good sample, and is practically free from disease, which is the result of the care exercised in looking after the seed and the practice of dipping the same in antiseptic solution prior to planting.

The main objects of the trials were to demonstrate the value of manuring, the benefit to be gained from selecting seed from plants of high productive capacity, together with individual performances of various varieties under the same cultural conditions.

Manurial Experiments.

The effect of applying lime for the improvement of the yield of this crop was also tried, but, as in former years over a series of tests, the results from liming have not justified the cost. The results from manuring, however, are excellent, and prove for still another season that judicious manuring, even on this rich land, is a practice both advisable and economically sound.

This class of country does not respond to heavy dressings of artificial manures as the swamp lands and clay loams of Gippsland do, but the experience gained from trials extending over a period of six years points conclusively to the advisability of applying moderate dressings of about 3 cwt. per acre of phosphatic fertilizer, from which material increases at low cost per acre may be expected.

A feature of this year's results is the continued success obtained in the improvement of yields from the use of seed selected from heavy producing plants. A glance at the table showing the comparative yields from selected and unselected seed will no doubt be surprising to those who have given but little consideration to this aspect of improvement in crop production.

While attention must, of course, be given to every phase in the cultivation of a crop, it is becoming increasingly evident that the selection of good seed is the fundamental principle on which rest all other factors governing the yield of any crop.

The tables given below will, with but little further explanation, show the lessons to be gained from these experiments. The value of these lessons is proved in that, allowing for seasonal weather variations, the results are consistent with those of other years.

RESULTS OF MANURIAL EXPERIMENTS.

TABLE I.—SHOWING YIELD FROM (1) PLOTS TREATED WITH DIFFERENT VARIETIES AND QUANTITIES OF MANURES WITH ADDITION OF GROUND LIMESTONE, AND (2) PLOTS SIMILARLY TREATED, BUT WITHOUT ADDITION OF LIMESTONE.

Manures.	Yield per Acre.		
	Market Size.	Small.	Total.
	T. c. q.	T. c. q.	T. c. q.
(1) Limed Portion.			
Limestone (ground) applied at the rate of 1 ton per acre.			
0. Castor meal 5 cwt. per acre	5 0 0	1 10 0	6 10 0
1. Super. 3 cwt. per acre	5 7 2	1 2 2	6 10 0
2. Super. 6 cwt. per acre	5 17 2	0 15 0	6 12 2
3. Super. 9 cwt. per acre	6 17 2	1 2 2	8 0 0
4. Super. 6 cwt., pot. sulp. 1 cwt.	6 17 2	1 0 0	7 17 2
5. No manure	3 15 0	1 5 0	5 0 0
6. Super. 6 cwt., amm. sulp. 1 cwt.	6 15 0	0 15 0	7 10 0
7. Super. 6 cwt., 1 cwt. each amm. sulp. and pot. sulp.	6 17 2	1 0 0	7 17 2
8. Market garden 3 cwt. per acre	7 5 0	1 0 0	8 5 0
9. Basic phos. 3 cwt. per acre	5 15 0	1 0 0	6 15 0
10. Super. 3 cwt., castor meal 2 cwt.*	7 0 0	0 15 0	7 15 0
11. Super. 3 cwt. (check)*	7 10 0	1 5 0	8 15 0
Average	6 4 3	1 0 3	7 5 2
(2) Unlimed Portion.			
0. Castor meal 5 cwt. per acre	5 12 2	1 5 0	6 17 2
1. Super. 3 cwt per acre	6 12 2	1 2 2	7 15 0
2. Super. 6 cwt. per acre	6 15 0	1 2 2	7 17 2
3. Super. 9 cwt. per acre	7 0 0	1 2 2	8 2 2
4. Super. 6 cwt., pot. sulp. 1 cwt.	7 0 0	1 0 0	8 0 0
5. No manure	4 7 2	1 0 0	5 7 2
6. Super. 6 cwt., amm. sulp. 1 cwt.	6 17 2	1 0 0	7 17 2
7. Super. 1 cwt., 1 cwt. each amm. sulp. and pot. sulp.	7 10 0	1 2 2	8 12 2
8. Market garden 3 cwt. per acre	7 10 0	1 0 0	8 10 0
9. Basic phos. 3 cwt. per acre	6 5 0	1 5 0	7 10 0
10. Super. 3 cwt., castor meal 2 cwt.	8 0 0	1 0 0	9 0 0
11. Super. 3 cwt. (check)	8 5 0	1 5 0	9 10 0
Average	6 16 1	1 2 0	7 18 1

* Plots 10 and 11 were on land that had peas on last year. The balance of the manurial section was not under peas, but was fallowed.

In order that these figures may be made more informative, the following table has been compiled showing the exact tonnage increase per acre of market-size tubers due to the various manures, together with the value of the increase expressed in money value. The value of the crop has been taken as £8 per ton, which will probably prove to be a low average estimate when the season closes.

Table II.—Increases in Weight and Value of Market-size Tubers Due to Manuring, Calculated at £8 per Ton (Weights taken from Unlimed Portion).

Manures.	Market Size Tubers per Acre.	Increase from Manuring.	Cost of Manures per Acre.	Increased Value per Acre.
	T. c. q.	T. c. p.	£ s. d.	£ s. d.
0. Castor meal 5 cwt. per acre ..	5 12 0	1 4 2	1 12 6	9 16 0
1 Super. 3 cwt. per acre	6 12 2	2 5 0	0 18 9	18 0 0
2. Super. 6 cwt. per acre	6 15 0	2 7 2	1 17 6	19 0 0
3. Super. 9 cwt. per acre	7 0 0	2 12 2	2 16 6	21 0 0
4. Super. 6 cwt., pot. sulp. 1 cwt. ..	7 0 0	2 12 2	2 13 0	21 0 0
5. No manure	4 7 2	Check	Nil	Check
6. Super. 6 cwt., amm. sulp. 1 cwt ..	6 17 2	2 10 0	2 16 0	20 0 0
7. Super. 6 cwt., 1 cwt. each amm. sulp. and pot. sulp.	7 10 0	3 2 2	3 11 6	25 0 0
8. Market garden 3 cwt. per acre ..	7 10 0	3 2 2	1 7 6	25 0 0
9. Basic phos. 3 cwt. per acre ..	6 5 0	1 17 2	0 18 6	15 0 0
10. Super. 3 cwt., castor meal 2 cwt. ..	8 0 0	3 12 2	1 11 9	29 0 0
11. Super. 3 cwt. (check)	8 5 0	3 17 2	0 18 9	31 0 0

The manure costs per acre have been calculated on Melbourne prices plus £1 per ton to allow for cost of freight, cartage, and application. The heavy yields produced on plots 10 and 11 are due to these plots having been planted on ground which had had a crop of peas harvested from them. They are very valuable as showing the manurial value of the pea crop to the crop which follows. The balance of the plots, Nos. 0 to 9, inclusive, were planted on bare fallow land.

It will be noted that while the manures in every case showed a very large percentage increase as an investment, the phosphatic manures—superphosphate, market garden, and basic phosphate—easily topped the list. It will be further noted that when these were applied at rates of not more than 3 cwt. per acre, results approaching those from much heavier dressings were obtained. Growers reading these particular results should bear in mind that they apply only to the red volcanic soil of the central districts of this State. In other potato districts, heavier dressings than 3 cwt. per acre are required for the best results. The following table gives a further interesting analysis, inasmuch as it shows the actual cost of producing each extra ton weight of crop from the different kinds and weights of manures.

Table III.—Cost of Each Ton Increase of Market Tubers from the Different Manures.

Manures.	Value of Manure.	Tonnage Increase per Acre.	Cost of Manure for each Ton Increase.
	£ s. d.	T. c. q.	£ s. d.
0. Castor meal 5 cwt. per acre	1 12 6	1 4 2	**1 6 6**
1. Super. 3 cwt. per acre	0 18 9	2 5 0	**0 8 4**
2. Super. 6 cwt. per acre	1 17 6	2 7 2	**0 15 6**
3. Super. 9 cwt. per acre	2 16 6	2 12 2	**1 1 0**
4. Super. 6 cwt., pot. sulp. 1 cwt. ..	2 13 0	2 12 2	**1 0 6**
5. No manure	Nil	Check	Check
6. Super. 6 cwt., amm. sulp. 1 cwt. ..	2 16 0	2 10 0	**1 2 6**
7. Super. 6 cwt., 1 cwt. each amm. sulp. and pot. sulp.	3 11 6	3 2 2	**1 3 0**
8. Market garden 3 cwt. per acre ..	1 7 6	3 2 2	**0 9 0**
9. Basic phos. 3 cwt. per acre	0 18 6	1 17 2	**0 9 9**
10. Super. 3 cwt., castor meal 2 cwt. ..	1 11 9	3 12 2	**0 8 10**
11. Super. 3 cwt. (check)	0 18 9	3 17 2	**0 5 0**

It is thus shown that in their capacity to produce heavier weights of crop cheaply the phosphatic manures stand alone in this class of country. A remarkable result is shown in the case of plot 11, where the cost was reduced to the low figure of 5s. per ton when 3 cwt. of superphosphate operated in conjunction with the residual effect of the pea crop grown, but harvested, previous to the planting of the potatoes.

Ripe v. Immature Seed Tests.

Table IV. gives the figures of the ripe versus immature seed test.

Table IV.—Ripe v. Immature Seed.

Variety.	Ripe Seed.	Immature Seed.	Increase Due to Immaturity.
	T. c. q.	T. c. q.	T. c. q.
Carman III.	7 15 0	9 15 0	**2 0 0**

Here, again, is tangible evidence of the higher productiveness of potato crops grown from seed which has been harvested in an immature condition. This practice has been consistently and persistently advocated by this Department for years, and should be more generally in vogue than it is at present.

No reason can yet be given for the heavier yields obtained from seed potatoes which have not ripened on the stalk, but it is a fact, nevertheless, and one which has been demonstrated very many times in departmental trials. Its adoption generally would do much to raise the average acre production of potatoes.

Varietal Tests.

The results obtained in the varietal tests are set out in Table V.

Table V.—Varietal Tests.

Variety.	Yield—		
	Large.	Small.	Total.
	T. c. q.	T. c. q.	T. c. q.
Carman III.	8 15 0	1 0 0	**9 15 0**
Carman I.	6 0 0	1 0 0	**7 0 0**
Duchess	7 0 0	1 5 0	**8 5 0**
Earliest of All	7 0 0	1 0 0	**8 0 0**
Browns River	6 10 0	1 0 0	**7 10 0**
Minato	8 0 0	1 0 0	**9 0 0**
Manhattan	7 0 0	1 5 0	**8 5 0**
Red Ohio	5 0 0	1 2 2	**6 2 2**

Table VI.—Results of Selected versus Unselected Seed, Grown under the Same Conditions of Soil and Culture.

Weights given for Market Sizes only.

Variety.	Selected.	Unselected.	Per Cent. Increase per Acre.	Value of Increase per Acre at £8 per Ton.
	T. c. q.	T. c. q.		£ *s.* *d.*
Carman III.	8 15 0	7 0 0	25	**14 0 0**
Manhattan	7 0 0	5 10 0	27	**12 0 0**
Minato	8 0 0	6 0 0	33⅓	**16 0 0**
Duchess	7 0 0	5 5 0	33	**14 0 0**
Red Ohio	5 0 0	3 10 0	43	**12 0 0**

These figures speak for themselves. The system of selection adopted is to select seed from heavy-bearing plants as they are dug and to store these tubers by themselves. The standard of yield at and over which seed is classed as "selected" is seven market-size tubers per plant. The "run" of the crop which these are tested against is harvested without discrimination, that is, the produce of the plants as they grow—good, medium, or poor—constitute the "run," and are harvested without selection. No effort is made to ensure that tubers classed as the "run" are below average in prolificacy—they are a true average of the crop. When one considers the improvement made in all classes of stock by selective treatment, it is obviously incontrovertible logic to maintain that parallel improvement can be secured by similar treatment being applied to plant culture.

The results of the Catani, Korumburra, Trentham, and Thorpdale manure trials will be published in the October *Journal*.

THE RED DANISH MILK (R.D.M.) CATTLE.

Denmark has since its early history been a country rich in cattle. From old days cattle have played a large part in the economy of the country, and in the early centuries of the Danish history steers have been one of the most important export articles. Until the close of the "seventies" in the 19th century the production of butter, compared with the production of meat or the sale of live cattle, played a subordinate part. But since 1880 the production of butter has become the most important branch of the Danish cattle industry, and for more than a generation butter has been the most important export article from Denmark.

At present two distinctly national Danish breeds dominate in the cattle herds of the country: at the islands and in the southern part of the Jutland Peninsula we find the Red Danish (R.D.M.) Milk Cattle, and in the other part of Jutland the Black and White Jutland breed prevails, though with a considerable addition partly of the Red Milk Cattle, partly of Short Horns.

Since the middle of the 19th century the Danish cattle, and especially the Red Danish Milk Cattle, has been subject to systematical breeding, with the result that at present it is of a very high standard as to frame combined with the power of yielding much milk of good quality. In this work it has always been the aim to develop the breed in a sound, healthy and economical way.

In dairy farming it is of great importance to keep records of the yield of each individual cow. Keeping records of the amount of milk yielded by each cow has on the best managed farms been a practice in Denmark for nearly 100 years. Gradually, as the production of butter assumed greater importance, the necessity was seen for recording not only the amount of milk yielded per cow, but also the amount of butter which could be made from a certain quantity of milk.

N. J. Fjord, a lecturer at the Royal Agricultural College in Copenhagen, designed in 1878 an apparatus for estimating the contents of cream in milk. The invention of this apparatus was due to the wish of the dairies to have a means of estimating the richness of the milk as delivered by farmers. However, Fjord's machine was also used, though not very extensively, in determining the richness of the milk from the single cow.

By using Fjord's "control apparatus" it became generally known that there was a great difference in the richness of the milk of individual cows, wherefore there was in the beginning of the "nineties" of the last century a great desire to find a practical method for determining the percentage of fat in the milk of each cow. In 1893 the Agricultural Experimental Laboratory began some comparative experiments with various apparatus determining the amount of fat in milk. The result of the experiments was to recommend as the most practical the apparatus constructed by the Swiss Dr. N. Gerber.

In 1895 the first Danish Milk Recording Society (Cow-testing Society) and also the first Co-operative Milk Recording Society in the world was founded at Vejen, near Askov. Thirteen farmers, owning together just over 300 cows, co-operated and appointed a young man, well up in dairy work, to keep records on the farms in question of the

amount of milk and the percentage of fat in the milk of each individual cow. In estimating the contents of fat in the milk the apparatus constructed by Dr. N. Gerber was used. The object of the first recording society was to attempt to form strains of cattle yielding much and rich milk.

The first recording society was not long left alone in the field; everywhere throughout Denmark where there was an interest for rationally conducted breeding of dairy cattle, recording societies on the pattern of the society of Vejen sprang up. The fodder of cattle also was recorded, for it seemed advisable to know not only how much and how rich milk each cow produced, but also the amount of fodder consumed to obtain the result.

During the past 30 years since the first association was formed a great development has taken place in said undertakings. In 1924, there were 1,083 milk recording societies in Denmark dealing with about 30,306 herds, or at least 412,000 heads of cows. In other words, the yield of milk, percentage of milk-fat, and the quantity of fodder consumed per head are recorded for more than 30 per cent. of all cows in Denmark.

In the following is given some statistical figures regarding the increase in the number of Danish cows, and the result obtained by keeping records of the cattle herds in Denmark:—

Number of Cattle in Denmark.

(In 1,000 heads.)

Year.	Milk Cows.	Other Horned Cattle.	Total.
1837	578	277	855
1888	954	506	1,460
1898	1,067	678	1,745
1909	1,282	972	2,254
1914	1,310	1,153	2,463
1924	1,369	1,298	2,667

Number of Milk Recording Societies in Denmark.

Year.	Number.	Herds.	Cows.	Recorded Cows in Per Cent. of all Cows.
1903–04	294	6,600	111,900	10·3
1913–14	587	12,757	208,013	15·8
1923–24	1,083	30,306	412,022	30·1

Average Yield per Cow under Control in the Cow-testing Societies in the Danish Islands. (Red Danish Milk (R.D.M.) Cattle.)

Year.	Number of Cows under Control.	Average Yield for all Cows.		
		Galls. Milk.	Per. Cent. Fat.	Lb. Butter.
1899–00	23,445	617·10	3·36	236·28
1904–05	86,277	673·88	3·42	262·68
1909–10	115,952	671·31	3·50	269·06
1914–15	112,709	694·86	3·57	283·80
1919–20	120,817	643·90	3·66	270·38
1923–24	188,586	761·46	3·73	325·60

Average Yield of Cows Registered in the Official Herdsbooks for Red Danish Milk (R.D.M.) Cattle.

——	Galls. Milk.	Per Cent. Fat.	Lb. Butter.
First Register published 1921 ..	935·55	4·05	435·60
Second Register published 1922 ..	981·80	4·04	456·50
Third Register published 1923 ..	944·43	4·09	468·16
Fourth Register published 1924 ..	997·00	4·14	474·98

There are also many high records in single herds of the Red Danish milk cattle, and a few will be given here, but it is to be remembered that Danish farmers do not believe in creating records such as are made in America. The records mentioned in the following are from herds fed on a general economical basis.

In a herd of 66 cows on the farm Kollekolle, Værlose, the average yield was—

1923-4—861.88 gallons milk, 4.52 per cent. fat, 451 lb. butter.

A herd of twelve cows belonging to Mr. Rs.Kristiansen, Ottesgaard, Pederstrup, gave as an average per cow—

1923-4—861.88 gallons milk, 4.40 per cent. fat, 552.2 lb. butter.

A herd of seven cows belonging to Mr. N. P. Hansen, Tune, Hedehusene, gave as an average per cow—

1923-4—1,191.22 gallons milk, 4.44 per cent. fat, 609.4 lb. butter.

Such figures are to be found all over the country.

The very best single cow in the societies in the year 1923-4 was number 38, belonging to Mr. Bech, owner of the estate Krusesminde, Korsor. The record of this cow was—

2,639.40 gallons milk, 3.82 per cent. fat, 1,157.2 lb. butter.

Yearly records of the herd from each farm are published every year. These records have been used as a guide in selecting cattle for breeding purposes. In many of the better herds family records have been set up, in which the family (pedigree descendants) of each cow is kept apart. These records also contain description of the exterior of each cow, and records of the total yearly milk and butter yield; these records serve as a valuable guide for buyers of breeding stocks, as they show the characteristics of each family.

At cattle shows, collections of dairy cattle from herd—especially family collections in close mutual relation, so far as possible—are exhibited together.

Hereby the stockholder in a great degree is guided in finding out where those herds which he is wanting are bred. In the show catalogues the records of all the exhibited cows are published, as well as those of the dams and granddams of the bulls. In the judging and classifying of the exhibited cattle, the exterior as well as the milk records counts for the cows, and for the bulls the ancestral as well as the offspring qualities are of importance.

In later years there has been gathered and published much information about the influence of the individual bull as to frame, yield of milk, and butter-fat in his offspring. These facts facilitate the selection of sires that are to be the foundation of future stockbreeding.

The first *Official Herdbook of Bulls* of the Red Danish milk cattle was published in 1888 for the Island of Sealand, and soon similar

ones appeared for Funen and Lolland-Falster. In 1896, these were amalgamated in a herdbook for bulls of Red Danish milk cattle for the whole country, of which a volume has been published every year since. Only prominent bulls are accepted in these herdsbooks. Since 1896, about 1,931 bulls have been recorded, generally after their third year.

An *Official Herdbook of Cows* of the Red Danish milk cattle appeared for the first time in 1888 for Sealand, in 1891 for the Island of Funen, and in 1896 for the Islands of Lolland-Falster. From 1921, these provincial herdbooks were amalgamated into a herdbook for cows of Red Danish milk cattle for the whole country. A volume is published annually, comprising about 300 cows. Only cows from herds for which a family pedigree herdbook is kept are accepted, and only cows yielding above a stated minimum and of approved exterior.

Both herdbooks for bulls and for cows comprise, therefore, only selected individuals, and thereby draw attention to the very best breeding animals.

In both sets of herdbooks as much information as possible is given of the descent of, and of the prizes gained by, each individual; a description of the exterior is also given for each animal, and for each cow records are given of the controlled yields as obtained by the Milk Recording Societies.

An *Official Register* of young animals of the Red Danish milk cattle, containing all information regarding ancestors, yield, &c., of each individual, has been established during the later years as a guide for purchasers of breeding stock of the Red Danish milk cattle from at home and abroad. The first volume of this register, containing 1,092 bulls, heifers, and cows, was published in 1924, and the next will be published this year.

The Red Danish milk cattle has been greatly developed by this wide-ranging breeding work. The best herds have reached a very high standard as to a dairy cattle exterior, and the progress in milk yields is really astonishing.

All information regarding the Red Danish milk (R.D.M.) cattle which is wanted will be given, upon applicaiton, to the Agricultural Council, Copenhagen, Denmark.

[Reprinted from *Hansen's Dairy Bulletin*, England, Vol. X., Nos. 5-6.]

DANISH EGG EXPORTS IN 1924.

During the year 1924, Denmark exported about 7,000,000 great hundreds of eggs, as against about 6,500,000 great hundreds in 1923. The increases recorded would have been larger had not the winter been so long and the spring correspondingly late in coming. As usual, Great Britain was the principal market for the Danish eggs, but during the year Germany also became an important buyer. The exports to Great Britain amounted to something like 5,500,000 great hundreds, while Germany took rather more than 1,000,000 great hundreds. Norway and Sweden were small buyers, these countries probably being now able to supply their own needs as regards eggs.

THE POULTRY INDUSTRY.

THE NEED FOR EXPORT OF EGGS.

By W. C. Rugg, Poultry Expert.

How the Industry has Grown.

The poultry industry of Victoria has reached the most critical stage in its history. In July, 1923, I wrote that the poultrymen of Victoria would shortly have to give serious consideration to the development of an export trade. That time is here now.

During the last eighteen months I have travelled nearly all over the State, and everywhere poultry-keeping is increasing so rapidly that we have every reason to believe saturation point has almost been reached. Farmers who formerly had from 10 to 20 hens are now keeping hundreds; men in some of the country centres who some time since were keeping hundreds now have thousands. In one small country town, 100 miles from Melbourne, a poultry-farmer last year sold 18,000 day-old chicks, while another, just outside one of our large country towns, sold 4,200 day-old chicks within a radius of 1 mile of his home. Another man 250 miles from Melbourne is now carrying 3,500 birds and last year he sent 32 tons of eggs to Melbourne. On one irrigation settlement alone there are over 52,000 laying hens. In the metropolitan area the numbers of birds kept on nearly all the large commercial farms are increasing rapidly. Several large farms that have had ten and twelve years' experience—some of them carrying over 12,000 laying hens—are planning to further extend. One farm hatched 100,000 chickens last year, most of which went to country districts. This year many of the day-old chick suppliers are fully booked up for all they can supply in the next four months. With the growing increase in the number of fowls kept, an enormous increase in the supply of eggs is to be expected in the coming summer. It is quite certain that Victoria can no more consume all the eggs she can produce than she can absorb all the butter; and it is vital to those engaged in the industry that a market be found outside of Victoria.

The English Market.

In a letter to the London *Times* last month Professor Edward Brown (who is probably the greatest authority on poultry in the world) states that England's consumption of eggs and poultry for 1924 was worth forty million pounds sterling made up as follows:—

Eggs:—		
Home Produced	£14,238,000	
Imports, including those from Ireland	£20,231,000	
		£34,469,000
Poultry:—		
Home Produced	£2,883,000	
Imports, including those from Ireland	£2,532,000	
		£5,415,000
		£39,884,000

This consumption averages 18s. 6½d. per head of the population, a figure less than one-half of the *per capita* consumption in Canada and the United States of America. By Australian, and particularly Victorian poultry-men, these figures should be very earnestly considered. For here is a solution of their problem—almost an unlimited market for their products—if they will only take advantage of it now. England can and will take all the eggs we can produce; but one thing is absolutely essential, and that is, that only eggs of the very best quality and grade be sent.

The Department of Agriculture is willing to assist exporters, and to that end is fitting up a first-class grading and packing dépôt at the Government Cool Stores. This is conveniently situated and offers every facility for storing and shipping eggs expeditiously. The poultrymen of New Zealand have exported eggs successfully for the last three years and the quality has so impressed the London buyers that they have more than doubled their orders. This result is a wonderful tribute to all concerned—the suppliers, the exporters, the shipping companies, and the New Zealand Department of Agriculture which supervized the grading. The last million and a half eggs were landed in London, and not one bad egg was found in the shipment.

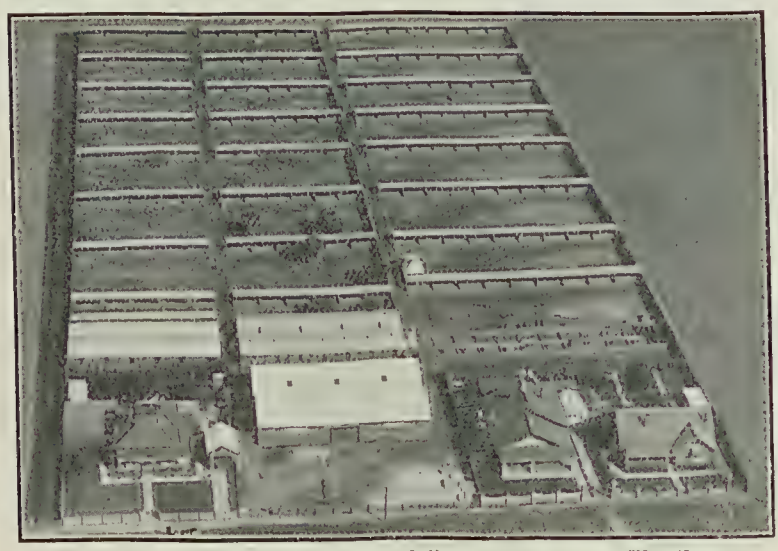
What has been done by New Zealand can be done by Victoria and with greater prospects of rapid expansion. We are nearer to the market, we have steamers leaving our ports more frequently, we have the poultry-men with the plants and who thoroughly understand their work, and above all we have a climate second to none in the world for the economical production of every class of food needed for the best development of our poultry. On the poultrymen themselves depends the financial success or failure of this export trade. The Department of Agriculture will see that the grading is right. The shipping companies have demonstrated that they can carry the eggs safely and at the right temperature; but the greatest responsibility rests on the producer in his care of the egg from the nest to the grading dépôt. The essentials are:—Clean wholesome feeding of the birds, clean nests, the gathering of eggs twice daily, and the storing of them in a cool place (not over 60 deg.). Eggs should be forwarded to the dépôt twice a week, if possible, and in packing, the following directions should be closely followed:—Use clean card-board fillers, or else wire fillers, lined with felt or paper to prevent the wire marking the eggs. Do not use chaff; it is insanitary, wasteful, and sometimes taints the eggs. They should be graded, and no egg under two ounces should be included in a case forwarded to the dépôt for export. The poultrymen of Victoria have this year an opportunity to establish a reputation for their eggs on the London market. If they fail to take advantage of it, I am sure they will have to take a price in the summer that will be far below the cost of production.

An Interesting Victorian Poultry Farm.

As an example of the growth of commercial poultry farming, there appears on page 478 an aerial photograph of the "Ribblesdale" Poultry Farm, Werribee, owned by Messrs. Carter Brothers. They started a little over ten years ago in a very small way, and are now carrying over 12,000 laying hens—all White Leghorns. They do not exhibit at shows, neither do they specialize in stud birds; their business is strictly that

of an egg-producing farm. They deliver their eggs to Melbourne and suburbs in their own motor lorries.

The plant occupies five acres. All the buildings on it are of brick. As an experiment, one of the sheds was built of concrete, but the proprietors consider that brick is more economical on their farm. To keep this flock up to full capacity it is necessary for them to breed between 5,000 and 6,000 pullets each year. This means hatching between 15,000 and 16,000 chickens per annum to allow for cockerels and for loss in rearing. They have lately increased the incubator capacity on their farm from 6,000 to 15,000 eggs. The brooder house is over 100 feet long, and is divided into rooms approximately 14 x 20. It is heated by a boiler, and hot water pipes run underground and up stands into each brooder room. Stop valves are provided, so that the hot water may be cut off from any room when desired.



Messrs. Carter Bros. "Ribblesdale" Poultry Farm at Werribee.

This farm has grown to what it is as a result of splendid team work by the family—Mr. and Mrs. Carter (senr.) and their three sons. They have been hard working, and resourceful in overcoming the difficulties in the building up of this up-to-date plant. Although not one of the four men had learned the trade of bricklaying, they laid every brick on the poultry plant, which includes a very fine feed-room shown in the centre of the photograph. Besides, they built the two brick villas, fitted with all modern conveniences, shown on the right, which are occupied by Mr. W. and Mr. J. Carter, junr. All members of the firm are now in a position to enjoy the substantial benefits from their labour, in the shape of better conditions of working, comfortable homes, and some of the modern luxuries, i.e., very fine private cars, &c., of which they have three. Messrs. Carter Brothers have recently purchased 5 acres of land at a very high price a short distance from their present farm. Plans for the erection of another up-to-date poultry plant have been drawn up. A section of the laying sheds is already erected, and, as at the home farm, the buildings are all of brick.

LUCERNE TOP-DRESSING EXPERIMENTS.

By L. C. Bartels, B. Ag. Sc., Chief Irrigation Field Officer.

The complete results from the lucerne top-dressing tests instituted in 1924 at Swan Hill and Rochester are given below. The record of yields in both places shows that increased production has resulted from the use of manures. Tests were made with superphosphate in varying quantities—at Swan Hill, from 2 cwt. to 6 cwt. per acre, and at Rochester, from 1 cwt. to 4 cwt. per acre. Other forms of phosphatic manure used at both places were ground rock phosphate and bone fertilizer. In addition gypsum and lime were tried.

Experiments at Werribee, where comprehensive tests with fertilizers have been undertaken, have demonstrated the value of phosphate manure for lucerne. It has been shown there that top-dressing with

Lucerne Plots at Swan Hill.

superphosphate is the most economical practice, and that the highest yields are obtained when superphosphate is supplemented by an application of gypsum. The results from the Swan Hill and Rochester tests are in agreement with the Werribee results.

At Swan Hill, where the soil is the black clay loam of the Murray flats, the response to a dressing of superphosphate was remarkable, and throughout the season the growth on the top-dressed plots afforded striking evidence of the value of the fertilizer in increasing yields. The super top-dressed plot bore a dense growth at each cutting in marked contrast with the untreated plots alongside. Many settlers inspected the plots, and for all of them the wisdom of this method of treatment was established beyond doubt.

When lucerne was first grown on the Swan Hill flats, the fertility of the soil induced high yields without manure, but latterly the returns have become much smaller, and a remark commonly heard is, "The flats are going back." To some extent this is true, and it is evidenced in the yields from the unmanured plots shown in the tables below. In

general the appearance of the stands at Swan Hill is disappointing. Many are irregular. The wet winter of 1923 caused much of the lucerne to be "drowned out," and the practice of persistent grazing usually followed has contributed to the bad condition of the stands.

But if the unmanured plots reflect the present condition of the flats, the manured plots show what may be obtained from them by suitable treatment. One plot yielded at the rate of over 7 tons per acre, and it must be borne in mind that this was from lucerne more than five years old.

The explanation is that the soil on the Swan Hill flats, like other soils of a similar origin, is naturally very fertile. Our Australian soils, however, are lacking in phosphoric acid, and those of the Swan Hill district have this deficiency in common with the rest. Phosphoric acid is an essential for plant growth, and it is obvious that, no matter how abundant other elements of plant food may be, the scarcity of this one necessary constitutent limits the development of irrigated lucerne.

When lucerne was first sown on the flats the deep roots were able to extract what available phosphoric acid there was in the soil, but with the depletion of this supply, the development of the plants was restricted. The reason why top-dressing with superphosphate induces such good growth is that it supplies phosphoric acid in an easily available form. When it is applied to the soil it reverts to a less soluble condition, but it is still available to the plant.

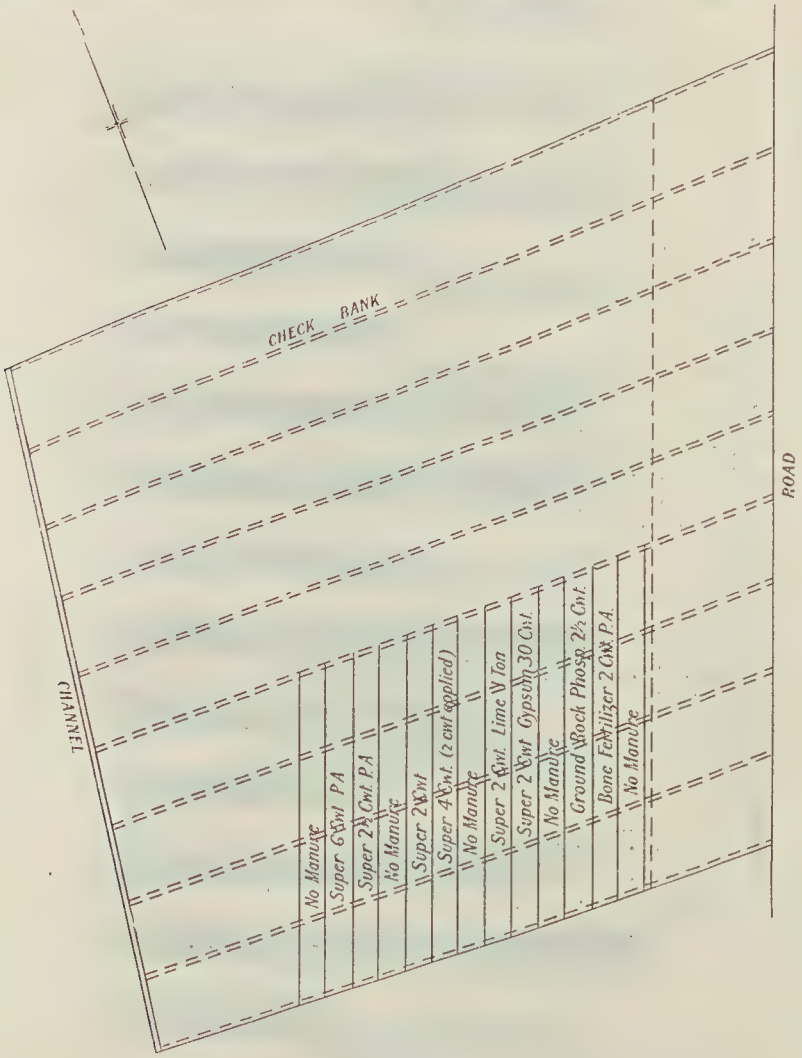
The importance of the availability of the phosphoric acid is demonstrated by the results from the plots treated with ground rock phosphate. This is the insoluble material from which superphosphate is made, and the dressing of 2 cwt. per acre given was equivalent to 4 cwt. of superphosphate, yet it will be noted that the yield was scarcely better than that from the no manure plot. The high phosphatic content and the price of the rock phosphate appeal to some farmers, but in none of the tests undertaken at Werribee, Swan Hill, or Rochester has it given even fair results.

In a lesser degree what has been said of rock phosphate applies to bone fertilizer. This manure also supplies nitrogen—a valuable element of plant food—but lucerne is more or less independent of outside supplies of nitrogen. It has colonies of bacteria on its roots, which extract nitrogen from the atmosphere, and the lucerne makes use of the nitrates elaborated from this.

At Swan Hill both the lime and the gypsum induced extra returns, the gypsum being the more effective. But it will be noted that an additional 2 cwt. of superphosphate brought about a bigger yield than either the lime or gypsum, although it is expected that their effects will not be confined to one year. Gypsum is available within easy carting distance, and it was this gypsum or "kopi" from the local deposit which was tried in the experiment. The indications are that its use will be advantageous on the flats. The main value of gypsum seems to lie in its action on the physical character of the soil, and top-dressing with it may reduce cracking of the soils. The cost of top-dressing with lime would appear not to be warranted by results.

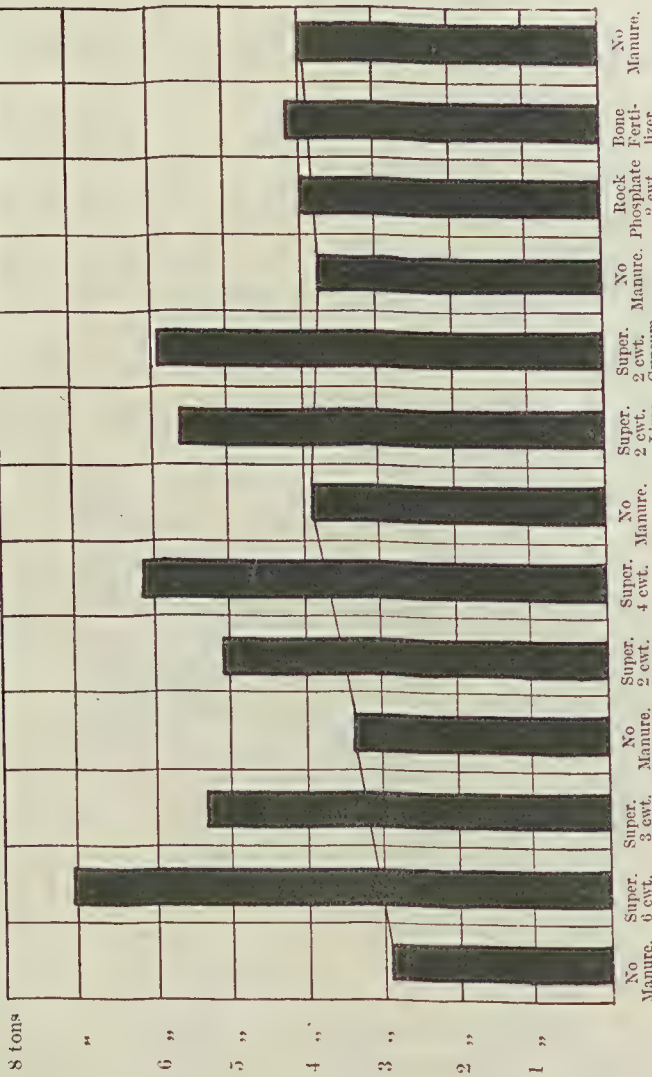
The Rochester plots were laid down at Nanneella, and the land selected was not the best on the settlement, but the results teach the same lessons as those to be learned at Swan Hill, viz., that manuring

with soluble phosphatic manure will increase the yields from a lucerne stand; that insoluble phosphates have less value; that gypsum applied in addition to superphosphate will further increase the yields.



Plan of Experimental Plots at Swan Hill.

Mr. S. Masters, at Swan Hill, and Mr. C. Macauley, at Nanneella, on whose blocks the plots were laid down, gave every assistance in the work of harvesting and weighing the lucerne on the plots, and I am indebted to the officers of the Water Commission, Messrs. Skene and Harvey, at Swan Hill, and Mr. Roy, at Rochester, for their active co-operation.



Graph showing yields from various plots.

Graph showing yields from various plots.

LUCERNE TOP-DRESSING TESTS.

Swan Hill—1924-25.

Table I.—Yields of Hay Per Acre (Calculated on Basis of 15 Per Cent Moisture).

Plot (1-14 acre).	First Cut. 29.10.24.	Second Cut. 11.12.24.	Third Cut. 21.1.25.	Fourth Cut. 13.3.25	Fifth Cut. 29.5.25.	Total.
	Cwt.	Cwt.	Cwt.	Cwt.	Cwt.	Cwt.
1. No Manure	9·1	16·4	16·7	12·4	3·9	**58·5**
2. Super. 6 cwt. per acre ..	30·0	29·2	40·1	27·7	14·9	**141·9**
3. Super. 3 cwt. per acre ..	22·7	24·9	31·0	20·0	8·1	**106·7**
4. No Manure	10·9	18·5	20·4	13·7	4·3	**67·8**
5. Super. 2 cwt. per acre ..	19·5	24·5	29·8	19·9	7·5	**101·2**
6. Super. 4 cwt. (in two applications)	22·6	26·3	36·3	25·9	11·8	**122·9**
7. No Manure	13·7	18·2	24·5	16·1	5·0	**77·5**
8. Super. 2 cwt., Lime 1 ton ..	20·6	27·7	31·7	23·1	9·4	**112·5**
9. Super. 2 cwt., Gypsum 1½ tons	24·0	28·9	33·0	23·2	9·4	**118·5**
10. No Manure	14·0	19·6	21·1	15·2	4·8	**74·7**
11. Ground Rock Phosphate, 2 cwt.	14·7	20·4	22·4	16·3	5·3	**79·1**
12. Bone Fertlizer, 2 cwt. per acre	17·9	21·8	23·8	17·7	6·2	**87·4**
13. No Manure	15·6	20·5	21·2	16·4	6·1	**79·8**

Table Ia.—Table Showing Increased Returns Resulting from Top-dressing.

Plot.	Yields Per Acre.	Check Yields.	Increase Due to Manure.	Value of Hay (Increase) Produced Per Acre.	Cost of Manures Per Acre.	Profit from Use of Manure Per Acre.
	Cwt.		Cwt.	£ s. d.	£ s. d.	£ s. d.
1. No Manure ..	58·5	58·5	..	..	..	..
2. Super. 6 cwt. ..	141·9	(61-6)	80·3	10 0 9	1 11 6	**8 9 3**
3. Super. 3 cwt. ..	106·7	(64·7)	42·0	5 5 0	0 15 9	**4 9 3**
4. No Manure ..	67·8	67·8	..	..	..	..
5. Super. 2 cwt per acre ..	101·2	(71·0)	30·2	3 15 6	0 10 6	**3 5 0**
6. Super. 4 cwt. (in two applications)	122·9	(74·3)	48·6	6 1 6	1 1 0	**5 0 6**
7. No Manure ..	77·5	77·5	..	..	..	..
8. Super. 2 cwt., Lime 1 ton ..	112-5	(76·6)	35·9	4 9 9	2 10 6	**1 19 3**
9. Super. 2 cwt., Gypsum 1½ tons	118·5	(75·7)	42·8	5 7 0	1 5 6	**4 1 6**
10. No Manure ..	74·7	74·7	..	..	..	..
11. Ground Rock Phosphate 2 cwt. ..	79·1	(76·4)	2·7	0 6 9	0 11 0	(Loss) **0 4 3**
12. Bone Fertilizer 2 cwt. per acre	87·4	(78·1)	9·3	1 3 3	0 18 0	**0 5 3**
13. No Manure ..	79·8	79·8	..	..	..	..

LUCERNE TOP-DRESSING TESTS.

Rochester, 1924-25.

Table II.—Yields of Hay Per Acre (15 Per Cent. Moisture).

Plots (1–16 acre).	First Cut. 10.11.24.	Second Cut. 19.12.24.	Third Cut. 29.1.25.	Fourth Cut. 20.3.25.	Fifth Cut. 22.5.25.	Total.
	Cwt.	Cwt.	Cwt.	Cwt.	Cwt.	Cwt.
1. No Manure	26·05	14·0	11·7	3·5	..	55·25
2. Super. 1 cwt.	29·16	14·6	14·1	4·4	..	62·26
3. Super. 2 cwt.	31·2	17·8	18·25	5·1	..	72·35
4. No Manure	26·05	14·75	14·3	4·8	..	59·9
5. Super. 4 cwt. (in two applications)	28·75	17·26	20·1	8·6	1·5	76·2
6. Super. 2 cwt., Lime 1 ton ..	28·9	18·03	19·1	6·6	1·2	73·8
7. No Manure	18·6	11·9	12·4	3·6	..	46·5
8. Super. 2 cwt., Gypsum 1½ tons	28·5	17·05	20·3	6·5	·5	72·85
9. Ground Rock Phosphate, 2 cwt.	19·7	12·6	12·4	3·0	..	47·7
10. No Manure	18·9	10·2	10·9	2·6	..	42·6
11. Bone Fertilizer, 2 cwt. ..	20·8	15·6	13·1	3·4	..	52·9
12. Super. 2 cwt. per acre ..	25·65	13·5	16·0	4·4	..	59·55
13. No Manure	18·6	11·5	10·5	2·3	..	42·9

Table IIa.—Table Showing Increased Returns Resulting from Top-dressing.

Plot.	Yield of Hay per Acre.	Check Yields.	Increase in Yield.	Value of Increase in Yield.	Cost of Manure Per Acre.	Profit. Per Acre.
	Cwt.		Cwt.	£ s. d.	£ s. d.	£ s. d.
1. No Manure ..	55·25	55·25	..	..	..	..
2. Super. 1 cwt. ..	62·26	(56·8)	5·46	0 13 6	0 5 3	0 8 3
3. Super. 2 cwt. ..	72·35	58·35)	14·0	1 15 0	0 10 6	*1 4 6
4. No Manure ..	59·9	59·9	..	..	..	..
5. Super. 4 cwt. (in two applications)	76·2	(55·5)	20·7	2 11 9	1 1 0	1 10 9
6. Super. 2 cwt., Lime 1 ton ..	73·8	(51·0)	22·8	2 16 0	2 10 3	0 5 9
7. No Manure ..	46·5	46·5	..	..	..	..
8. Super. 2 cwt., Gypsum 1½ tons	72·85	(45·2)	27·65	2 19 0	2 10 3	0 8 9
9. Ground Rock Phosphate 2 cwt.	47·7	(43·9)	3·8	0 9 6	0 11 0	(Loss) 0 1 6
10. No Manure ..	42·6	42·6	..	..	..	..
11. Bone Fertilizer, 2 cwt. ..	52·9	(42·7)	10·2	1 5 6	0 18 0	0 7 6
12. Super. 2 cwt. per acre ..	59·55	(42·8)	16·75	2 1 9	0 10 6	*1 11 3
13. No Manure ..	42·9	42·9	..	..	..	..

* Average, £1 7s. 10d.

In the foregoing tables an endeavour has been made to show the increased yields resulting from top-dressing in money values. For the purpose, the lucerne hay is estimated as being worth £2 10s. per ton, and the cost of applying the manures as follows:—

Superphosphate (18 per cent.)	£5	5	0 per ton.
Bone Fertilizer	9	0	0 per ton.
Rock Phosphate	5	10	0 per ton.
Lime	2	0	0 per ton.
Gypsum—			
At Swan Hill	0	10	0 per ton.
At Rochester	1	6	8 per ton.

Plots at Rochester.

COUNTRY TELEPHONES IN NORWAY.

Owing to the great extent of the country and its mountainous conformation, the means of communication in Norway by road or railway are, in many districts, far from satisfactory. As a set-off to this, says a departmental publication, the use of the telephone has developed to an extent that is probably unparalleled in any other country. In most of the rural districts the great majority of the farmers and artisans, and, in fact, even some of the farm labourers, have this means of communication.

VEGETABLE GARDENS ON DAIRY FARMS.

By H. W. Budd, Dairy Supervisor.

One of the problems to be faced on a great many dairy farms is the proper disposal of the drainage and manure from the cowshed and yards. Frequently, when visiting farmsteads, I have noticed everything tidy save the manure heap; this is allowed to be blown about by the wind in summer, and to get all the good washed out of it by winter rains. Occasionally, when a farmer is putting in some green fodder, the manure heap will get a clean up, but even this is not a certainty.

Vegetable Garden of Mr. F. Eales, Kolor, Penshurst.

The most common method of drainage is by means of an impervious open drain, laid down at the rear of the cow bails and extended from the side of the shed in the direction in which the natural fall of the ground lies. By this method the drainage is usually run on to grass land, or sometimes discharged into a manure heap. Another way is to run the manure into a cesspit, and to empty the contents occasionally; but in the press of work the cesspit may be neglected, and thus this method of dealing with the disposal of manure may perhaps be more offensive than simply draining it on to grass land.

Almost always when dairying is carried on close to a town or city the dairy farmer has no option but to use a cesspit. In the country, however, where space has not to be considered, the open drain running well out from the cowshed to a manure pit is preferable.

On several farms around Penshurst, vegetable gardens have been laid out on ground at a lower level than that of the cowyard, and thus the manure can be easily run there and profitably used. Farmers in that district are fortunate in that permanent water can be tapped almost anywhere, even on the top of stony rises, and many of them have pipes laid on to their milking sheds, and so are able to flush the floors daily. Those on the Kolor Estate, however, have a great disadvantage to meet. Owing to the stony nature of the country there is very little ground suitable for cultivation; hence to use the cowyard manure as a garden dressing is an excellent method of disposing of it.

Mr. Chas. E. Smith's Garden at Kolor, Penshurst.

Illustration No. 1 shows the garden of Mr. F. Eales, of Kolor, Penshurst. Here last spring Mr. Eales grew sufficient vegetables for his household, and in addition received about £20 for vegetables sold to the local greengrocers. When I visited his farm some time since there was growing in the garden a splendid lot of pumpkin, melon, and marrows, and Mr. Eales was getting ground ready for autumn planting. Besides annual vegetables he also grows in his garden rhubarb, and herbs, such as sage and thyme, and also strawberry plants and gooseberry bushes. As a breakwind, Mr. Eales has grown a nice hedge of tree lucerne (Tagosaste), and under this he keeps a dozen hives of bees.

Illustration No. 2 is a photograph of the garden on the farm of Mr. Chas. E. Smith, at Kolor, Penshurst, where, in addition to vegetables, a quantity of mangels is also grown. Mr. Smith is a share dairy farmer, and has been on this farm about four years. The garden was started on a very small scale, but it has been extended from time to time, and it now covers an area of about half an acre. Mr. Smith is very enthusiastic about it, and emphasizes the fact that

if a good supply of vegetables is available at all seasons it means a reduction in the family meat bill.

Another very good vegetable garden on to which the cowshed drainage is run, is that of Mr. A. Rentsch, of Penshurst. An advantage this garden has over most country gardens is that water is laid on to it for use as required, and here almost all through the year a splendid assortment of vegetables is grown.

Mr. A. Rentsch's Garden, Penshurst.

Some farmers will say that they have not the time in which to attend to a garden. Once, however, the plots are laid out, it does not require such a great deal of time to keep them in order, and the owner has the satisfaction of knowing that he is making an excellent use of manure and drainage from his cowshed, which might otherwise become, if not a nuisance, at any rate, an eyesore.

POULTRY FEEDING EXPERIMENTS.

By W. C. Rugg, Poultry Expert, and W. O. Pederick, Poultry Foreman, State Research Farm.

(1) Free Choice *v.* Wet Mash (Black Orpingtons).

After the publication of the results last year of the Free Choice Experiment conducted with White Leghorns, it was the opinion of many poultrymen, that although White Leghorns gave satisfactory results under that system of feeding, it would not be advisable to allow Black Orpingtons free access to food at all times, owing to the fact that they are a less active breed, and it was suggested that if they did not have to scratch and search for their food they would not take sufficient exercise, and therefore would become too fat to lay a payable quantity of eggs.

To ascertain if there were any grounds for this supposition, a feeding experiment extending over twelve months was conducted at the State Research Farm, Werribee, concluding on 31st March, 1925. As a check another pen was fed wet mash. One hundred and twenty Black Orpington pullets were selected, in quality about equal to an ordinary farm flock, and were divided into two pens of 60 birds each. None of the pullets was bred from single-mated hens, but all were from pens of hens mated to selected cockerels, and the progeny of each cockerel had been toe-marked. Care was taken that an equal number of daughters of each of the male birds used in the breeding-pens was placed in each of the experimental pens. Every effort was made in the selection of the pullets to have the two pens as even as possible in age, size, quality, and breeding.

At the commencement of the test the pullets were weighed; No. 1 pen—free choice—weighed 248½ lb., and No. 2 pen—wet mash—242½ lb.

System of Feeding.

No. 1 Pen—Free Choice.

All the different varieties of food were placed in separate hoppers which were vermin- and sparrow-proof.

The foods were—wheat, oats, maize, barley, wheat pollard, oat pollard, barley pollard, bran, meat meal, and rape seed meal. Green stuff was always available in a wire-netting basket; it consisted of green oats, green barley, rape, milk thistles, and rye grass in winter, and lucerne in the summer; it was cut fresh every day, and placed in the basket not chaffed.

No. 2 Pen—Wet Mash.

The wet mash consisted of wheat, pollard, bran, and chaffed green stuff—equal parts by measure—and was mixed as follows:—The bran was saturated with soup made from boiled livers; it was dried off with pollard to a nice crumbly condition, and the chaffed green stuff was then added and thoroughly mixed through it. The birds were given as much as they could eat. Chaffed green stuff was fed at midday, and

the evening feed of grain consisted of wheat, Algerian oats, cracked maize and barley scattered in the litter. Chaffed green stuff was again fed after the grain feed at night. Shell grit and granulated charcoal were always available.

Housing.

The birds were housed in an open-fronted corrugated iron shed facing the east; a little over 4 square feet of floor space was allowed to each bird. The floor was kept covered with from 4 to 6 inches of straw. Dust baths were provided and droppings boards were used under the perches.

Health of the Birds.

The health of the birds in each pen was equally good throughout the test.

Summary.

Pen.	Average number of eggs per bird.	Return per bird.	Cost of food per bird.	Profit over cost of food per bird.
		£ s. d.	s. d.	s. d.
No. 1 Free Choice ..	172·06	1 4 10	7 3⅝	17 6¼
No. 2 Wet Mash ..	161·73	1 2 1	7 3¾	14 9¼

The birds were weighed four times during the test, and the dates and weights are shown in the following table:—

Weight of Birds.

Date.	No. 1 Free Choice.		No. 2 Wet Mash.	
	Number of birds.	Weight.	Number of birds.	Weight.
1st April	60	248½	60	242½
1st August ..	60	298	60	301
1st December ..	60	285½	60	285½
31st March ..	60	289	60	288

It will be noted that the Wet Mash pen gained in weight to the extent of 45½ lb. in the twelve months, whereas the Free Choice pen gained only 40½ lb. in spite of the fact that they had free access to all the food hoppers at any time during the test.

The table of the amount of the different grains consumed by the Free Choice pen shows that, next to wheat, oats was the grain most favoured by the birds, and although they had the choice of all the other grains at all times, they ate 874 lb. of oats.

The oats used were only fair average quality, straight off the harvester, and were not clipped or graded. This grain can always be bought at a much cheaper rate than wheat. Its value as a poultry food has been demonstrated by feed tests at the Research Farm during several years, yet poultrymen desiring to produce eggs economically do not use oats to the extent they should.

RESULTS.

Pen No. 1—Free Choice.—60 Black Orpingtons.

Month.	Food Consumed.													Eggs Laid.			
	Wheat.	Oats.	Maize.	Barley.	Wheat Pollard.	Oat Pollard.	Barley Pollard.	Bran.	Meat Meal.	Rape Meal.	Total.	Cost.			Number.	Value.		
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	£	s.	d.		£	s.	d.
April ..	157	123	64	38½	15½	5½	11	13½	4	4	436	1	14	7½	563	6	1	2
May ..	111	97	67	50½	27½	15½	15	23	5	5½	417	1	13	9¾	835	9	18	7
June ..	122½	61	61	34½	31	11½	28	17	5½	8½	380½	1	11	9¾	956	9	17	6
July ..	139½	56	72	54½	32	16	48	29	3½	4½	455	1	17	9¼	922	7	4	0
August ..	108½	102	65	40½	36	15½	57	35	5	5	469½	2	0	10¼	948	5	5	4
September	84½	72	71	49	39	13	59	39½	3	8	438	1	17	3¼	1,018	5	0	8
October	83	48	73	100	42	8	64½	44	3	1	466½	1	17	8½	1,039	5	2	9
November	75	80	59	68	45	10	58½	55	4	..	454½	1	17	4¼	986	5	13	0
December	92	84	68	53	39	7	31	42	4½	..	420½	1	15	1½	891	5	8	3
January	95	62	62½	65½	40	11½	21	49	3	..	409½	1	16	3¼	815	4	16	2
February	107	52	48½	53½	37	6½	30	47	3	..	384½	1	14	3¼	657	4	11	3
March ..	175	37	15	74½	34	21	11	43½	6½	..	417½	2	2	1¼	694	5	15	8
	1,350	874	726	682	418	141	434	437½	50	36½	5,149	21	18	11¾	10,324	74	14	4

Pen No. 2—Wet Mash.—60 Black Orpingtons.

Month.	Food Consumed.									Eggs Laid.	
	Wheat.	Oats.	Maize.	Barley.	Pollard.	Bran.	Meat Meal.	Total.	Cost.	Number.	Value.
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	£ s. d.		£ s. d.
April ..	122	61	61	31	76	38	24	413	1 12 10	402	4 6 6
May ..	133½	66½	66½	33½	89	44½	21	454½	1 16 3¼	635	7 11 0
June ..	137½	68	68	34	81	40½	21	450	1 16 9½	867	8 19 1
July ..	146	73	73	37	76	38	17	460	1 17 0	990	7 14 8
August ..	149	74½	74½	38	75	37½	12	460½	1 19 0¾	917	5 1 11
September ..	142	71	71	36	90	45	8	463	1 18 5¾	1,017	5 0 7
October ..	176	89	21	44	102	51	8	491	2 0 3½	1,088	5 7 8
November ..	163	81	..	41	86	43	8	422	1 16 2½	931	5 6 8
December ..	158	78	..	39	84	42	8	409	1 15 7½	891	5 8 3
January ..	143	71	..	36	87	43½	9	389½	1 14 10¾	695	4 2 0
February ..	139	70	..	35	76	38	11	369	1 13 5¼	650	4 10 3
March ..	158	79	..	39	82	41	12	411	1 18 2½	621	5 3 6
	1,767	882	435	443½	1,004	502	159	5,192½	21 19 1¼	9,704	68 12 1

(2) Dried Milk *v.* Meat Meal.

There is a great difference of opinion amongst poultrymen as to the value of meat meal over dried milk for the production of eggs. To test the merits of the two, an experiment was conducted at the Research Farm, Werribee, during the twelve months from 1st April, 1924, to 31st March, 1925. One hundred and twenty White Leghorn pullets (none of them bred from single matings, but from pens of hens mated to pedigree cocks) nearly equal in age, quality, size, and weight were chosen for the experiment.

The toe marks indicated from what cock the pullets had been bred, and to eliminate as far as possible the chance of there being in any pen an undue proportion of birds bred from parents of the best egg-producing strain, the pullets were all examined, and where there were four birds from the same cock, two were placed in one pen and two in the other, and so on.

The weights of the birds on the first day of the test were as follows:—No. 3 pen, dried milk, 187 lb. (60 birds); No. 4 pen, meat meal, 188 lb. (60 birds).

Housing.

The birds were housed in an open-fronted corrugated iron shed facing the east. They were kept in the shed throughout the test, no outside run being made available. The floor space allowed was a little over 4 square feet per bird, and the floor was kept covered with from 4 to 6 inches of straw. Dust baths were provided and droppings boards were used underneath the perches

System of Feeding.

Dry mash in hoppers was available to both pens at all times; chaffed green stuff was fed at midday and mixed grain at night; chaffed green stuff was also fed after the grain food at night. Both teams were housed, treated and fed exactly the same, with the exception that to the dry mash fed to Pen 3, 10 per cent. dried milk was added. To the dry mash of Pen No. 4, 10 per cent. meat meal was added instead of the dried milk.

The mash fed to both pens consisted of equal parts of bran and pollard by measure and 3 per cent. powdered charcoal.

The green stuff was green oats, green barley, rye grass, milk thistles, and lucerne. The grains fed were wheat, oats, maize, and barley.

The dried milk and meat meal used in the test were found to contain—

	Meat Meal.	Dried Milk.
	%	%
Moisture	7·92	6·55
Ash	5·89	6·17
Protein	56·69	21·19
Crude Fibre	5·58	1·04
Nitrogen—		
Free Extract	3·55	44·92
Ether Extract	20·37	20·13

Health of the Birds.

The general health of the birds was good throughout the test, and although No. 3 Pen (dried milk) laid over 2,000 eggs more than the other (meat meal) there was not during the whole twelve months of the test anything in the appearance of the birds in the two pens to suggest that one lot was laying so much better than the other.

Summary.

Pen.	Average number of eggs per bird.	Return per bird.	Food cost per bird.	Profit over cost of food.
		£ s. d.	s. d.	£ s. d.
No. 3 White Leghorns —60 birds (Dried Milk)	211·46	1 9 7½	7 11½	1 1 8
No. 4 White Leghorns—60 birds (Meat Meal)	174·73	1 4 0	7 0½	0 16 11½

It will be noted on referring to the table of food consumed that the pen fed on dried milk consumed 430 lb. more mash than that fed on meat meal; this was probably due to the fact that the milk made the mash more palatable. The birds of the former pen also ate 41 lb. more grain. The total cost of the extra food amounted to £2 15s. 1d., but as the milk-fed pen returned £16 14s. 6d. more for eggs, it must be considered a highly satisfactory result.

The birds were weighed at intervals during the test. The weights were as follows:—

Date.	Pen No. 3 Milk Fed.		Pen No. 4 Meal Fed.	
	Number of birds.	Weight.	Number of birds.	Weight.
1st April	60	187	60	188
1st August ..	60	224	60	225½
1st December ..	60	209	60	197
31st March ..	60	212	60	203

Food Prices.

The following table gives the prices of the various grains fed in the experiments:—

Month.	Wheat.	Oats.	Barley.	Maize.	Bran.	Pollard.
	per bushel	per bushel	per bushel	per bushel	per ton	per ton
	s. d.	s. d.	s. d.	s. d.	£ s. d.	£ s. d.
April	4 5	3 5	3 5	4 9	6 0 0	7 0 0
May	4 8	3 4	3 6	4 10	6 0 0	7 0 0
June	5 0	3 4	3 6	4 10	6 0 0	7 0 0
July	5 3	3 4	3 6	4 6	5 10 0	6 10 0
August	6 0	3 6	3 6	4 3	6 0 0	7 0 0
September	5 11	3 6	3 9	4 3	6 0 0	7 0 0
October	6 1	3 0	3 9	3 10	5 5 0	7 0 0
November	6 5	2 9	4 3	3 11	5 15 0	7 0 0
December	6 6	2 10	4 6	3 11	5 15 0	7 0 0
January	6 8	2 10	5 8	4 0	5 15 0	7 0 0
February	6 4	2 9	5 8	4 0	6 5 0	7 15 0
March	6 5	2 9	6 6	4 3	6 5 0	7 15 0

RESULTS.

Pen No. 3.—Dry Mash—60 White Leghorns—Dried Milk.

Month.	Food Consumed.									Eggs Laid.	
	Wheat.	Oats.	Maize.	Barley.	Pollard.	Bran.	Dried Milk.	Total.	Cost.	Number.	Value.
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	£ s. d.		£ s. d.
April ..	113	57	57	28	94	56	19	424	1 14 4	732	7 17 7
May ..	124	62	62	31	86	52	17	434	1 15 6½	914	10 17 4
June ..	126	63	63	31	71½	43½	14	412	1 14 3½	803	8 5 10
July ..	138	69	69	34	86½	52	17½	466	1 18 3¼	878	6 17 2
August ..	138	69	69	34	97	58½	19	484½	2 2 2¼	1,118	6 4 2
September ..	133	67	67	33	100	60	20	480	2 1 11¼	1,323	6 10 11
October ..	166	83	20	41	106	63	21½	500½	2 3 4	1,404	6 19 0
November ..	151	75	..	38	124	74	25	487	2 3 5½	1,321	7 11 4
December ..	175	87	..	44	101	61	20	488	2 4 5½	1,300	7 18 0
January ..	132	66	..	33	120	72	24	447	2 1 3¼	1,262	7 9 0
February ..	119	59	..	30	110	66	22	406	1 17 9¾	880	6 2 2
March ..	142	71	..	35	102½	61½	20½	432½	2 1 3	753	6 5 6
	1,657	828	407	412	1,198½	719½	239½	5,461½	23 18 1½	12,688	88 18 0

Pen No. 4—Dry Mash—60 White Leghorns—Meat Meal.

Month.	Food Consumed.									Eggs Laid.	
	Wheat.	Oats.	Maize.	Barley.	Pollard.	Bran.	Meat Meal.	Total.	Cost.	Number.	Value.
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	£ s. d.		£ s. d.
April ..	113	57	57	28	80	48	16	399	1 10 11	532	5 14 6
May ..	124	62	62	31	60	36	12	387	1 10 6¼	645	7 13 4
June ..	126	63	63	31	58	34½	15½	391	1 11 11¼	556	5 14 10
July ..	138	69	69	34	73½	44½	14½	442½	1 15 1¾	833	6 10 2
August ..	138	69	69	34	93½	56	19	478½	2 0 4	1,068	5 18 8
September ..	133	67	67	33	75	45	15	435	1 16 9¼	1,185	5 17 3
October ..	166	83	20	41	83½	50	16½	460	1 18 6	1,205	5 19 3
November ..	140	70	..	34	84½	50½	17	396	1 14 1¼	1,022	5 17 1
December ..	142	71	..	35	77	46½	15½	387	1 13 11¾	1,021	6 4 1
January ..	142	71	..	35	85	51	17	401	1 16 3½	966	5 14 0
February ..	119	59	..	30	95	57	19	379	1 13 10	774	5 7 6
March ..	142	71	..	55	92	55½	18½	434	2 0 8¼	677	5 12 10
	1,623	812	407	421	957	574½	195½	4,990	21 3 0¼	10,484	72 3 6

Hereunder are the prices paid for other foods used during the experiments:—

Oaten pollard, 2s. 6d. per bushel; barley pollard, 2s. per bushel; rape meal, 7s. per cwt.; meat meal, 18s. per cwt.; dried milk, 14s. 6d. per 60 lb.

GRADE "A" MILK AS A STANDARD PRODUCTION.

The conditions under which milk is obtained from the cow and subsequently handled cannot help leading to bacteria getting into the milk. The most minute particle of dust, fodder, dung, &c., in the milk will introduce armies of bacteria, which, even if they are not always actually disease germs, will lead to the milk going sour very much more quickly than it would do if the bacteria were present in smaller numbers. An average sample of milk taken under normal conditions may easily contain a million bacteria in a teaspoonful of liquid; it being by no means a difficult matter actually to count the number of bacteria, if the correct scientific methods and apparatus are employed.

Although the production of milk free from bacteria is an absolute impossibility, a movement is now on foot to reduce the bacterial "counts" in milk as produced on the farm.

While all bacteria are not disease-carrying, a milk of low bacterial count is undoubtedly of the greatest importance, as the less total bacteria there are present, the less the chance of an odd disease germ creeping in. A bacterially pure milk also keeps sweet for very long periods, and six days in the winter or two days in the summer are by no means uncommon for the keeping periods of milk produced with a little care by those who understand how to avoid excessive bacterial contamination.

The more enlightened public are prepared to pay a slightly higher price for pure milk, which compensates for the additional cost of production, as well as leaving a little extra margin of profit. As the value of purer foods, especially for infant feeding, becomes more generally recognized, the demand for standard pure milk will increase; and no doubt the farmer will quickly meet such demand, for there is nothing mysterious or difficult in producing milk of high bacterial purity.

The possibility of producing milk under better conditions and of a certain standard of cleanliness is legislated for in the Milk (Special Designations) Order, which came into force last year (1st January, 1923), and which specifies the necessary conditions and standards required for milk to be sold as Certified, Grade A, or Pasteurized.

Qualifications for Grade A Production.

In the case of Grade A milk, which at the present moment is considered to be the most practicable commercial form of high quality milk, a veterinary examination of the herd of selected and marked

cows is first necessary, as is also the removal from the herd of any animal likely to affect adversely the quality of the milk. The methods of milk production also must satisfy the Ministry of Health before the necessary licence is granted; but, beyond stating that no sample of the milk taken may contain more than 200,000 bacteria in 1 cubic centimetre (teaspoonful), and that a certain bacterium (*coli*) indicating dung contamination must be absent, the details of production and handling are left entirely to the good sense of the producer.

The mention of 200,000 bacteria in a teaspoonful would almost lead the uninitiated to think that a specially contaminated milk was being legislated for rather than a sample of graded purity. As a matter of fact, however, 1,000,000 bacteria in a teaspoonful of ordinary milk constitutes a fairly pure sample; for one must remember that these little creatures, introduced into the milk during production in the cow-shed, multiply with great rapidity, especially in warm weather.

There is also the comforting thought that every bacterium is not bad; and one has only to think of the use of artificial "starters" in butter and cheese-making to realize that by the most up-to-date methods one actually adds countless millions of a certain type of bacterium, bred specially for the purpose.

The microbes in the case of a "starter" are those which produce souring by lactic acid formation; and in butter and cheese, not only is a standard and pleasing flavour thereby imparted to the product; but the microbes added in such numbers take charge, as it were, of the situation, and prevent the development of less desirable cousins.

The Bacterial Count.

The importance of what is known as the "bacterial count" in Grade A milk is that, apart from whether the bacteria present are harmful, harmless or even beneficial, their number indicates in a fairly regular manner the standard of hygiene and cleanliness which has been observed in production and handling.

These counts are not made by the producer; but are carried out from time to time on official samples taken as a check on the methods of production employed; their value as an indication of cleanliness being very great, and the effect of any improvement in the production being quickly evident by a fall in the count. Most of the producers of Grade A milk find 1,000 a by no means impossible figure to which to keep down the bacteria in a cubic centimetre, and the July bacterial count of milk produced at Seale-Hayne College, taken by the University College, Reading, showed only 170 per cubic centimetre.

Present Standards.

As a matter of fact, the Ministry of Health has been very moderate in fixing the various bacterial standards, which are generally far and away above the actual values obtained by producers of the different grades. There should therefore be no difficulty whatever in keeping below the maximum figures as laid down, and there is little doubt that practically every Grade A milk producer is always well on the safe side.

At the same time, the Ministry of Health has been right in its leniency. The most important step probably ever taken in connexion with milk production should not be made too difficult at the start, and it is an easy matter to tighten things up when once the public and producers realize everything that the grading of milk means. Before many years are past, all milk for sale will undoubtedly be graded, and we shall then be astounded at the extreme moderation of present-day standards.

It must always be remembered that clean methods are infinitely more important than expensive and elaborate fittings. The person who still thinks that, without glazed tiles, polished water-taps, and cows groomed to show form, it is impossible to obtain Grade A milk, should at once free his mind of this error.

Sanitary fittings are a pleasant luxury, and may serve the useful purpose of maintaining the idea of cleanliness in the minds of the milkers, who are, it may at once be stated, of the utmost importance in the process. A clean milker with poor appliances will beat every time a careless milker in the most up-to-date surroundings.

Methods of Housing.

The cowshed for the production of Grade A milk should be provided with an impervious flooring under the hindquarters of the cows, and extending at least half-way up to the manger. The end of the standing should drop vertically into a gutter not less than 4 in. deep and sloped to carry away liquid. Concrete is the best material for this purpose.

The distance between the step-down into the gutter and the feeding trough is of great importance, and will depend upon the breed of cow concerned. The object to be aimed at is to force the cow to stand with her heels on the extreme edge of the standing, so that the dung may fall into the trough and not soil the animal when she lies down. The adjustment of the stall depth to an inch is of importance, and a metallic stanchion is preferable to a chain, as the latter allows too much fore-and-aft movement to the animal. A plentiful use of limewash at frequent intervals in the cowshed, put on with a brush and not sprayed, is necessary.

Clean Cows.

The udders of the cows should be kept clipped, and some Grade A producers also do the same to the flanks. Before milking, the flanks should be groomed down with a wet brush, and the udder and teats well wiped with a wet cloth. Cold water may be safely used for this purpose, and does no harm to the cows.

The milkers, who must understand the principles of clean milk production, should don white coats (in some cases, white caps are worn as well); wash their hands with soap and water, preferably before each cow is milked; and employ domed-top pails.

The first squirt or two of milk produced from each teat should be discarded; and one should take no notice of the complaint of the milker new to the job that it is impossible to direct the milk-stream into the rather small oblique opening of the pail provided. After milking, the milk should be taken at once out of the cow-shed and poured into a churn or other vessel provided with a top.

Sterilizing Utensils.

The sterilization of all pails, churns, cloths, &c., is of the utmost importance, experiments having proved that this precaution has a greater effect in keeping up the purity of the milk than any other. The installation of a sterilizer is probably the most obvious expense to which the would-be Grade A milk producer is put; but it may be mentioned that about £30 will secure a good plant, while for work on a small scale a simple apparatus worked by two oil stoves is efficient as well as cheap.

It is to be noted that the sterilizer is required to sterilize the vessels employed, and not for treatment of the milk, which at no stage is subjected to the action of heat.

Grade A milk production would be futile if contamination in the house were not prevented by the use of sealed glass bottles. Bottling of Grade A may be done either on the farm or by the retailer; but in the second case a sealed and labelled churn must be used for the transport of the milk from the farm to the bottler.

Grade A milk production is an easy and economical matter—not difficult and expensive as appears at first sight. The public demand for this type of milk of standard purity will quickly grow when the advantages are once realized; and it will pay all milk producers who mean to keep up with the times carefully to consider the possibility of producing Grade A.

[*D. R. Edwardes-Ker, Principal Seale-Hayne Agricultural College, in the Agricultural Gazette and Modern Farming (England)*, 15th *August*, 1924.]

EGG-GRADING IN THE UNITED STATES.

The report of the United States Secretary of Agriculture for 1924 states that the Department of Agriculture is undertaking a programme of egg standardization. After a careful study of existing egg grades and of the various factors affecting quality in eggs, and with the co-operation of representatives of farmers' organizations and others interested in the egg industry, two sets of uniform grades for eggs have been proposed. One is designed for use in wholesale channels of trade and is known as the United States wholesale grades. The other is a simpler set of grades, known as the United States buying grades, and is designed for use in buying eggs from producers at country points. These grades afford a practical basis on which eggs can be purchased and sold by means of which better prices can be paid to producers of the higher qualities. The Department has distributed thousands of circulars to farmers emphasizing the importance and advantages of grading, and extension services in more than twenty States are helping to bring the egg standardization programme to the attention of producers. Egg-inspection services have been established at New York and Chicago, where Department egg inspectors are available to examine and report upon the conditions and quality of egg shipments.

CATTLE POISONING.

A plant may be poisonous to one animal and quite innocuous to another. In other words, what is one beast's meat is another beast's poison. Nearly a century and a half ago Linnæus, in his journey through Dalecarlia, observed that the horses easily distinguished wholesome from noxious food. Being very hungry, they devoured all sorts of plants except the following:—Meadow-sweet, valerian, lily of the valley, angelica, loosestrife, marsh cinquefoil, crow's-bill, hellebore, monkshood, and many shrubs. Kalm, a disciple of the great Swedish naturalist, followed up this hint, and subsequently others of the Upsala students made numerous experiments to determine what animals will eat certain plants and what will reject them. These observations are recorded in an essay in the *Amœnitates Academicœ* for 1749.

One of the first facts observed is that a plant which is greedily devoured by domestic animals in the spring will not be tasted by them in the summer, when it is apt to grow rank in taste and smell, and becomes stalky and hard. Thus the nettle—*teste* Andrew Fairservice—is eaten by many people in the spring, but nobody would dream of making it into a dish for either man or beast later in the year. Again, some animals eat the flower, but will not eat the stalk, while others devour the leaves only. In making these experiments great care must be taken, for if an animal is hungry it will devour almost anything put before it, and in drawing our inferences insects must be entirely excluded, their organization being so entirely different from that of warm-blooded animals. It is, of course, a familiar fact that the sun-spurge, the milky juice of which causes blotches on the skin and is poisonous to mammals, is the almost entire subsistence of a species of moth.

But the differences between the higher domestic animals in this respect are very remarkable. Thus the long-leaved water hemlock will kill a cow, whereas the goat browses on it greedily. Monkshood kills a goat, but will not hurt a horse, and the bitter almond kills a dog, but is wholesome food for man. Parsley is deadly to small birds, while swine eat it safely, and pepper is mortal to swine and wholesome to poultry. Younger animals are also more acute in detecting the plants proper for them, though, as in the case we have recorded at the beginning of this paper, an empty stomach will often drive animals to feed upon plants not intended for them by nature. It has been held that animals can sometimes acquire a kind of experience, and are even able to transmit it to others. In Herefordshire, as far back as the year 1791, Benjamin Stillingfleet mentions the same fact in regard to the meadow saffron, which grows plentifully in some parts of that county. Is this so still? Curiously enough also, Gmelin said that in Siberia cattle eat the leaves of the hellebore when they first spring out of the ground, and are thereby killed. Another curious circumstance noted in Sweden is that cattle which have been reared in the plains of Schönen and Westregothia commonly fall into a dysentery when they come into the wooded parts, because they feed upon some plants which cattle used to these plains have learned to avoid. In the spring, when the water hemlock is under water, so that the cows are unable to smell it, they die in great numbers,

but when the summer comes and the ground is dry they are careful not to touch it.

A pasture may be excellent for one kind of stock and worse than useless for another. Heifers may waste away in enclosures where the meadow-sweet grows in such abundance that the cattle can scarcely make their way through it, whereas the goat which is bleating on the other side of the hedge is not allowed to go in, though he longs to be browsing on the plant, which affords him a most delicate and nourishing food. The spider wort, the mouse-ear scorpion grass, the dog mercury, the sun-dew, the hairy wood-grass, the lesser spearwort and the butterwort are all suspicious plants. The Andromeda (Kalmia) is known to be a rank poison to sheep in Virginia; while a closely allied species, the sheep laurel or lambkill (*Kalmua angistefolia*), is fatal to sheep in New York and other Northern States. Equally owing to the presence of three species of Andromeda, sheep are never healthy on the Lapland Mountains.

Horses are very nice in their feeding, though, like all animals, if hard pressed they will eat almost anything. In times of scarcity cattle will gnaw the bark off trees, and horses munch dead hedges. But we are not to conclude that these delicacies are the proper food of such stock.

Goats, however, feed on a greater variety of plants than any other domestic herbivora, but they prefer the extremities and the flowers. Sheep, on the other hand, leave the flower and eat the leaves. They are also content with less variety than other animals. Give them pasture grass, and they will live and grow fat in contentedness. Goats, more fastidious, will desert plenty in order to take their chance of getting a change of food. Pigs like the roots of the bullrush when fresh, but will not touch them when dry. They root up fields and meadows to get at the roots of the scorzonera and the clowns-all-heal, but do not touch the roots of the couch grass (quicken) unless pressed by the utmost necessity, albeit the contrary idea is very generally held by non-observant agriculturists.

Linnæus denies that cattle touch the marsh marigold, which the Swedish peasants believe makes the butter yellow. On the contrary, as a proof of how unobservant country people often are of those things which ought to most concern them, some of the yellowest butter in Sweden is made in those parts of the country where the cow-wheat grows most profusely.

[From the *Live Stock Journal,* England, 29th December, 1922.]

STRAWBERRY CLOVER.

Strawberry Clover is a perennial only just becoming thoroughly appreciated as a pasture plant for swamps and wet, marshy ground, and as it becomes better known, will be more largely grown. For moist situations there is no better business proposition.

The plant has spreading stems, pink flower, and foliage very similar to White Dutch Clover. The name has been derived from the fact that the seed heads very much resemble the strawberry in appearance. The plant is unequalled for swamps and wet, marshy ground, and is especially valuable under such circumstances, for as a rule only inferior swamp grasses and reeds of little or no fodder value can be successfully cultivated on this class of land. The plant is of first-class feeding value, and is also a soil improver. On moist, rich river flats, where Rye Grass, Cocksfoot, White Clover, and Lucerne can be successfully grown, Strawberry Clover will give equally as good or better results.

Another similarity to the strawberry is the way this plant throws its runners out and roots as it goes, thus spreading very rapidly.

Utilization.

Primarily, Strawberry Clover is a pasture plant, and is generally utilized for grazing. It also makes clover hay of first-class quality, and is, in addition, an excellent soil improver. The plant is thoroughly permanent, and once established will, with an occasional top-dressing, last for years. The first cost of the seed is practically the only one, as no cultivation is necessary at any time after seeding, and, apart from a possible top-dressing of lime or of bonedust and superphosphate mixed, every two or three years, no other treatment is needed to preserve the pastures in first-class condition. Strawberry Clover is, therefore, a very cheap plant to maintain, an important consideration in these days of high labour cost. In the Tarwin district of South Gippsland there are stands of Strawberry Clover that have been established over 25 years, and still in splendid condition.

Climatic and Soil Conditions.

The plant is fairly adaptable as regards climatic requirements, and will, under reasonably suitable conditions, give splendid results in districts ranging from temperate to cold. The best returns will be obtained from rich river flats, but the plant will give valuable results on any wet marshy land, especially on salty ground, and in districts near the seashore. Where conditions permit, the preparation of a first-class seed bed, such as is required for Lucerne, will be well repaid, but as a general rule it will not be possible to do more than perhaps merely harrow the surface.

The shelled seed is by far the most economical, and obviates the considerable loss occasioned in the process of dehusking. From 5 to 6 lb. of seed in husk is required to yield a pound of shelled seed.

Sowing the Seed.

The seed may be sown any time from the middle of March until the end of June, the earlier seed is sown, the longer the growing period available before the hot, dry weather sets in, and the better the plant is established. About 10 lb. of seed in husk is required for an acre, but by far the better plan is to use "Tarwei shelled seed," of which, sown by itself, 2 lb. per acre will be found ample. The seed is sown broadcast but to distribute more evenly and to ensure a good balanced ration, the following makes a first-class mixture per acre:—20 lb. Old Pasture Rye Grass, 3 lb. Creeping Bent, 1 lb. shelled Strawberry Clover, ½ lb. Alsike. After sowing the seed, should conditions permit, a rolling will do very much towards improving germination and ensuring a good stand.

General Treatment.

Apart from the rolling (where possible) after sowing the seed, no further treatment is necessary, except a dressing of lime every second year. Providing the field is not grazed too heavily, it will provide feed over a very lengthy period of the year. Strawberry Clover will, especially on medium-class soil, respond well to a top-dressing of bone-dust and superphosphate mixed every two or three years.

TYPE IN PIGS.

Irish bacon for the last fifteen years has consistently obtained the highest prices on the English import markets. The annual quantity yearly is not very great compared with the Danish supply, but the fact is worth noting that the general price level of Irish Wiltshire has been, through a series of years, as much above Danish prices as these have been above Canadian prices.

What are the types and standards for Irish hogs? The following points from a leaflet issued by the Department of Agriculture and Technical Instruction in Ireland will interest pig-breeders in Victoria:—

"One of the chief factors upon which the success of the business depends is the type of pig which is raised and fattened, and it is in this direction that the need for co-operation amongst the interests concerned is greatest. An animal of the Large York breed possessing the following points may be expected to give the greatest satisfaction:—

(1) Neat head. The pig that is very long in the head is usually narrow between the eyes, has seldom a very strong constitution, and has frequently rather more bone than is required. On the other hand, the pig that is very short in the head is usually too fat, too heavy in the fore end, thick in the neck, and heavy in the shoulders.

(2) Light neck and shoulder. The coarser parts of a side of bacon and those which fetch the lowest price are the neck and shoulder. The lighter these parts the better the side and the higher the price it will make.

(3) Deep heart and well-sprung ribs. Pigs are usually deficient in these points, which are, perhaps, the most valuable of those here enumerated. For stock purposes, breeders should therefore select only those animals which have these characteristics strongly developed.

(4) Thick loins. A pig with a good loin is almost invariably well ribbed and has a strong constitution. From a breeder's and feeder's point of view a good loin is most essential.

(5) Stout thighs. This means a pig thoroughly well developed in the hams. The hams are the most important parts of the animal, and, in the case of pigs killed for the ham and middle trade, the most valuable of all, provided they are not too fat.

(6) Short legs. A pig that is long in the leg is nearly always flat in the ham and lacking in plumpness.

(7) Long and silky hair. Good hair is an indication of strength of constitution as well as lean meat. The absence of hair generally proceeds from close breeding, and indicates a tendency to excessive fatness.

(8) A long side of moderate depth, with thick flank."

LIME IN SOILS.

The value of lime in soils is frequently stressed by instructors in scientific farming, and the practical agriculturist fully realizes the soundness of the advice. Many of the ills to which the soil is heir are attributable to the absence of this all-important element. It has truly been contended that where there is lime anything will grow, and in some of the agricultural districts its use has been neglected to such an extent that yields have gone down by 30 to 50 per cent. The *British Live Stock Journal* has something pertinent to say regarding the matter. "It has become an urgent necessity," it remarks, "to renew the lime on British farms. In the eighteenth century or earlier farmers practised liming and chalking so extensively that they built up the soil for generations to come. Their descendants have inherited their labours, and have been put to small expense in respect of lime. But there are limits to the possibilities of living upon ancestral capital, and British farmers must now consider seriously the renewal of lime upon their lands. There are sure indications that fields stand in need of this fertilizer. On grass land the gradual accumulation of a skin or mat of undecayed vegetable matter is an indication. Where such mats occur the husbandman finds bent grass, sorrel, or sour dock, sheep sorrel heath bedstraw, and other moorland plants, such as bracken, ling, and

bilberry. Other indications are the absence of clovers, and in patches the total disappearance of the herbage. On arable lands unreliability in clover, lucerne, barley, turnips, and swedes gives timely notice that the soil is turning sour. Such crops grown on sour land go off in patches at a fairly early stage, or show themselves less capable of withstanding drought, insect attacks, and diseases. None of these troubles can be controlled so easily as soil sourness. The wise farmer will, therefore, go to the root of the matter at once, and hasten to renew the supply of lime. The impossibility of obtaining a good clover crop, one of the most important in the rotation, is a serious drawback; sour land often in a seeds crop consisting almost entirely of rye grass (or of weeds where no rye grass has been sown), which tends to deplete rather than increase the store of nitrogen. Finger-and-toe or club-foot in turnips, swedes, and other cruciferous crops is a sure indication of lack of lime. On heavy lands excessive stickiness, a tendency to set hard, and difficulty in obtaining a tilth all prove deficiency in that reserve of lime essential to good husbandry."

ORCHARD AND GARDEN NOTES.

E. E. Pescott, F.L.S., Pomologist.

The Orchard.

If the winter spraying has been delayed, it should be completed as quickly as possible, and before the buds begin to swell and burst.

It is not advisable to spray the stone fruits with the red oil emulsion at this time, as there is danger of burning and destroying the early buds that may be swelling, and consequently loosen their outside scales. It will be safe, if the work be done at once, to spray apple, pear and quince trees with this spray, especially where the Byrobia Mite, scale insects, or woolly aphis are prevalent.

If it is intended that the lime-sulphur wash be the specific for these and other pests, it may be used with safety, although the spraying should be completed as early as possible.

That the lime-sulphur is valuable as a specific against "Black Spot" of the apple was shown in the report of the experiments in the *Journal of Agriculture* for August, 1918. The first spray should be given when the flower buds are more green than pink; and the second spray, when the centre flowers of the blossom cluster are pretty open.

The same report showed that a spray of 6.8.40 of copper-soda, sprayed when the earliest buds were showing pink, was a complete success against the "leaf curl" of the peach.

Where peach aphis has appeared, it will be advisable to spray at once with a strong nicotine solution. Tobacco stems should be soaked

in cold water for some days, and a teaspoonful of caustic soda added to a cask of steeping stems. The liquid should be made strong, and every endeavour made to kill out the first insects that appear. The preparations known as Black Leaf 40 and Nicotox are useful for this work.

Experiments carried out by the Government Entomologist in 1923 determined that red oil and nicotine sulphate mixed provided an efficient spray for woolly aphis. The mixture was made up of 1 gallon of red oil, 1 pint of nicotine sulphate, and 1 lb. soap, the latter being boiled till dissolved in 1 gallon of water. The red oil was then mixed in, and lastly the nicotine sulphate. To this was added 80 gallons of water. This provided spray material for 100 trees, at a cost of about 11s.

The pruning of deciduous trees should be at an end this month. The pruning of evergreens such as oranges, lemons, and guavas, may be left until later.

Young deciduous trees must be planted not later than this month. The soil should be trodden firm round the roots, and, when planting has been completed, the tree ought to be headed back to three or four buds on each arm.

Preparation may be made for planting citrus and other evergreen trees. It is necessary that the soil be well ploughed and sweetened in anticipation of planting in September and October.

In root-borer affected districts, the beetles will begin to appear during the latter part of the month. A close observance should be kept on them and the insects regularly collected and destroyed.

The Flower Garden.

All winter-flowering shrubs that have dropped their blossoms may now be pruned. It is important to prune these immediately after flowering, so that the plant may be able to make plenty of flowering wood for next season.

Seed beds and plots need constant cleaning and weeding. Weeds must now be kept out of the garden, both by hoeing and hand picking. The seedlings growing in their permanent situations should be thinned out and given a good chance to develop strong and sturdy plants.

Divisions of herbaceous plants such as delphiniums, cannas, shasta daisy, herbaceous chrysanthemums, rudbeckias, salvias, and phlox may still be planted out. If it is intended to leave the plants in the places they occupied last season, they should be lifted, the soil being well dug and manured, and the crowns planted back again. By this means the plants retain their vigour, and are able to produce good flowers each season.

Evergreen shrubs may now be planted out, if the spots chosen for them have been well dug and aired. All beds should be well dug over by this time, manure and refuse litter having been dug into the soil.

A few corms and tubers of early summer flowering bulbous plants, including Gladioli, may now be planted. Gladioli so planted will bloom in December.

The Vegetable Garden.

The plots should be well dug over at this time, adding gypsum or lime where any pests have been prevalent. In other beds stable manure should be well worked into the soil.

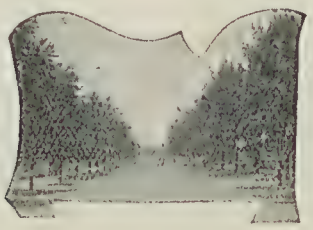
The soil should be rich, well worked, and warm, so that a quick growth may result. Vegetables quickly raised are generally more tender than slowly grown ones; and frequent changes of crops in the plots will give better results. At this season, the weeds will require constant checking; frequent use of the hoe will, therefore, be necessary, and in the rows hand-weeding should be resorted to.

All seedlings should be planted out, especially seedlings of cabbage, cauliflower, lettuce, and onion. Seeds of peas, carrots, parsnips, radish, lettuce, tomato, and broad beans may be sown.

Where they can be sheltered and protected from frosts, young tomato plants may be planted out for early fruiting. One method of managing these early plants is to place the young plant a few inches below the surface, and then a box, 8 or 9 inches deep, with top and bottom removed, over the plant at ground level. This can then be covered loosely with a piece of glass whenever necessary.

Potatoes, artichokes, and asparagus crowns may be planted. Asparagus beds should be kept free from weeds; they should have a loose surface, and a light top dressing with old manure would be beneficial.

In the frames, cucumber, vegetable marrow, melon, pumpkin, water and rock melon seeds may be planted. These are best planted in pots, placing three or four seeds in each pot; they then suffer no check when being transplanted into beds.



REMINDERS FOR SEPTEMBER.

LIVE STOCK.

Horses.—Feed stabled horses well; give green stuff if available. Continue rugging to encourage the shedding of the coat; good grooming will also be beneficial. Give hay or straw to grass-fed working horses. Feed old and badly-conditioned horses liberally. In foal mares due to foal early, if worked, should be turned out to paddock. Stallions doing stud duty should be fed liberally. Equivalent amount of cracked Indian corn (maize) may with advantage be substituted for oats, if latter grain is scarce.

Cattle.—Cows should still be rugged, but coverings should be removed frequently, in order to enable the animal to get rid of the old coat, or, better still, a good curry-combing may be given. Continue hay or straw. Look up treatment for milk fever in leaflet issued by Department, and treat cattle accordingly. Give calves a good warm dry shed. Give the milk to young calves at blood heat. Have feeding troughs or buckets clean. Don't over-feed. Feed regularly with regard to quantity and time. Provide a good grass run, or fine hay or crushed oats in a box or trough. Give a cupful of limewater per calf per day in the milk. The problem with many at the present time is how to rear calves without milk. This can be done very well by starting them on new milk for a fortnight, and then gradually substituting the milk with one of the calf meals on the market. To these it would be advisable to add two or three tablespoonfuls of cod liver oil. The following meal is in general use in Ireland:—Two parts, by weight, of oatmeal, 2 parts maize meal, 1 part pure ground linseed, all finely ground. Scald with boiling water, and allow to stand for twelve hours. Start with new milk, then gradually substitute skim and ¼ lb. of the meal mixture per head per day, gradually increasing to 1 lb. or more. In a month milk may be dispensed with altogether. The crushed oats, fed dry, have been found to give excellent results.

Pigs.—Supply plenty of bedding in warm well-ventilated sties. Keep sties clean and dry, and feeding troughs clean and wholesome. Sows may now be turned into grass run. If pigs are lousy dress with kerosene emulsion or sulphur and lard, rubbing well into crevices of skin, and disinfect sties. Worms are very prevalent at present, and may be treated by giving 2 to 10 grains of Santonin in form of pill, or from half to one teaspoonful of oil of turpentine in milk or castor oil. Read Bulletin 16.

Sheep.—Early-shorn sheep usually thrive, and can be fattened quickly. This is important where it is intended to sell old ewes that are of no further use for breeding purposes or for wool production. Strong Crossbred two-tooth wethers that were unsuitable for export can also be fattened quickly when shorn. Lambs not good enough for freezing should also be shorn early, as they will then fatten on the spring grass, and may be made good enough for the butcher.

Suitable shelter should be available for the protection of sheep off shears, particularly in the early spring months. Where insufficient knowledge of classing crossbred wool exists, draft the coarse sheep from the fine sheep before they enter the shearing shed; there will then be no difficulty in baling the wool separately. All dags should be removed before the sheep are carried by the shearers to the board. When the wool is on the table, avoid deep and careless skirting on small flocks; only very seedy parts, heavy fribs and stains should come off fleeces. Press in a box press, which forms square sides to bales. A printed pamphlet, setting out the quantity of wool of each class to be put in a bale, is to be had from most wool-selling firms. Brand bales boldly and neatly on the long and narrow side, or adopt any particular directions suggested by your wool broker.

The shed should be very well cleaned of all straw, chaff, dust, &c., before shearing starts. Cut back all misshapen feet at shearing time. All sheep off

shears should be branded clearly with suitable branding fluid; the near shoulder and ribs high up are the most promient spots to apply brand for future recognition. Broken-mouthed ewes, ewes with faulty udders, yellow and common fleeces should be culled and fattened for sale. Well-bred ewe weaners should be classed, and the best retained for future flock purposes. Wool with character, deep-stapled, fine to medium grade, will be in keen demand for years.

Poultry.—September is the last month for hatching for winter eggs. Incubators should be kept going, and broody hens set. Care must be taken to keep down vermin, as they now breed quickly; use sprays in houses and Insectibane or Izal in nests—nothing stunts chickens quicker than vermin. The food for young chicks should be fine oatmeal, biscuit meal, or finely-ground wheat, a little calcined bird's grit, a little chopped green stuff such as lettuce, thistles, or green lucerne or spring onions occasionally cut fine is a good tonic, and a pinch of powdered charcoal. Slightly moisten with new milk. Make the whole friable, and feed frequently ("little and often") just as much as they will readily eat, as an excess of food only sours and disturbs their digestive organs. Animal food may be given in small quantities after the first ten days once or twice a week. Chickens should be protected from damp ground and the cold, bleak winds.

CULTIVATION.

Farm.—Plant early potatoes, and work up fallow for the main crop. Keep fallow for summer forage crops well worked up with the disc and harrows. Make early sowings of mangolds, beet, field carrots, and turnips. Push on with the fallowing in the Northern Districts. Prepare land for tobacco seed beds by burning rubbish on the site; afterwards work up to depth of three or four inches.

Orchard.—Commence spring ploughing; plough in leguminous crops for green manure as soon as the plants are in full flower. Finish grafting early in the month. Spray peach and apricot trees with copper soda as the blossom buds are opening, as a preventive of "leaf curl" and "shot hole" fungi; watch for peach aphis, and spray when present with tobacco solution.

Flower Garden.—Cultivate and work up the surface to a fine tilth—clear out all weeds. Water newly-planted shrubs, &c., if the weather is dry. Plant out cannas, early dahlias, chrysanthemums, gladioli, and other herbaceous plants.

Vegetable Garden.—Plant out seedlings. Sow seeds for summer use, such as tomatoes, cucumbers, marrows, pumpkins, melons, &c. Plant out tomatoes, and shelter till frosts are over. Hoe and work up the soil surface.

VINEYARD.

Plantation of young vines (grafted or ungrafted) should be concluded before the commencement of September; pruning of old vines likewise, as well as tying down of rods on long-pruned vines. Prune recently-planted vines just before buds commence to swell (if not pruned when planted), cutting strongest cane back to two buds. Do not delay this work until buds have shot, as this seriously weakens the young vine. Field grafting may be carried out, if weather be fine and warm. If cold and wet, postpone until October. Swab vines preventively with acid iron sulphate to protect them from Black Spot, or Anthracnose. Should next spring be a wet one, disastrous outbreaks are probable in vineyards which have not received proper treatment. To avoid scalding, swabbing must be completed before the buds commence to swell. A bulletin (No. 42) dealing with this disease will be posted on application. Cultivation (scarifying or discing) must receive attention when soil is in suitable condition.

Cellar.—Conclude spring racking early in month, if not already done. Fill up, regularly, all unfortified wines.

BEE-KEEPING.

During the first or second week of September all hives should be examined to see that each colony has a laying queen and sufficient stores of honey to permit of normal development. Bees work better with a reserve of stores at this time of year, and when their supplies are reduced to a certain minimum, brood rearing is restricted, and may cease altogether for a time, and when, as a result of prolonged unfavorable weather, the reserve stores are used up, even sealed brood may be torn open and thrown out, and the colonies practically ruined for the season.

Strong colonies should have 15 to 20 lb. of honey ahead of daily requirement, medium and small colonies proportionately less. When during the examination of the hives less than this amount is found, the shortage should be made good by feeding, blood-warm, and inside the hive, a syrup made by dissolving 1½ or 2 parts of best white sugar in one part of boiling water. What is known as a frame feeder is the most suitable one for this purpose, or a simplicity feeder in a shallow super over the brood chamber may be used.

When no feeders are on hand, the syrup may be poured in a fine stream from the lip of a jug into an empty comb laid flat into a suitable dish. The jug should be held about 12 to 15 inches above the comb, otherwise the syrup will not enter the cells. After filling both sides, and keeping it in an upright position for a few minutes to drain off the surplus, the comb can be returned to the hive, repeating the operation on succeeding days till the needs of the colony are supplied. Honey of unknown origin should never be used for feeding on account of the risk of introducing disease.

Any colony found queenless, as indicated by the absence of brood or eggs, may be kept going till a queen can be raised or procured, by giving a comb of eggs or young brood from a strong colony once a week, provided there are sufficient bees left to make it worth while; if too small, unite with the nearest normal colony.

In early districts and where colonies went into Winter strong in bees, swarms may be expected from the middle of September onwards. Hives and frames for the number of first swarms expected should be on hand and ready for immediate use, so that none of the bees' labour may be wasted by allowing them to build comb in a temporary box. All frames should be wired so that newly-built comb may not break down in handling or during hot weather. Under normal conditions a swarm with a good fertile queen will build all worker comb during the first three weeks. It is the only time a full colony will not build drone comb from starters of foundation. While the queen deposits eggs into the worker cells as fast as they are constructed by the bees there will be no drone cells built. After three weeks the young bees from the first-laid eggs will hatch out, and the queen will return to that part of the comb to again deposit eggs into the vacated cells, and the newly-constructed cells on the edges of the comb being neglected by the queen, the remainder of the space in the frames will be filled with drone comb.

The aim of the bee-keeper, therefore, is to confine the building of comb from starters to the number of frames likely to be completed during the first three weeks after hiving the swarm, by removing two, three, or four frames in which no comb has been built four or five days after hiving. The follower or dummy board is pushed up against the remaining frames, and when these are completed frames with full sheets of foundation are added to make up the set.

Hives should always stand level, crossways to the frames; in the case of swarms hived on starters of foundation it is particularly important. Comb is always built truly perpendicular, and if the hive is not level to the frames the wires will be outside, instead of in the centre of the comb.

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Has converted useless Swamps into Valuable Pasturage (worth £50 an acre).

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HAS VALUABLE FODDER PROPERTIES, WILL GIVE SEVERAL CUTTINGS IN THE SEASON.

Cut on the green side it makes good hay and ensilage. It is strictly perennial, grows to a height of six or seven feet; has long, strong underground creeping roots, and **overcomes all native swamp growths.**

When POA AQUATICA was first introduced graziers and farmers were incredulous of the merits attributed to it, but in the short space of four seasons it has made such headway in the most intractable swamps infested by rushes, reeds, sedges, and sword grass that growers have been surprised at the results obtained.

Poa Aquatica obliterates dangerous bogs and makes the swamp surface everywhere safe for stock.

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PLANT ROOTS NOW.

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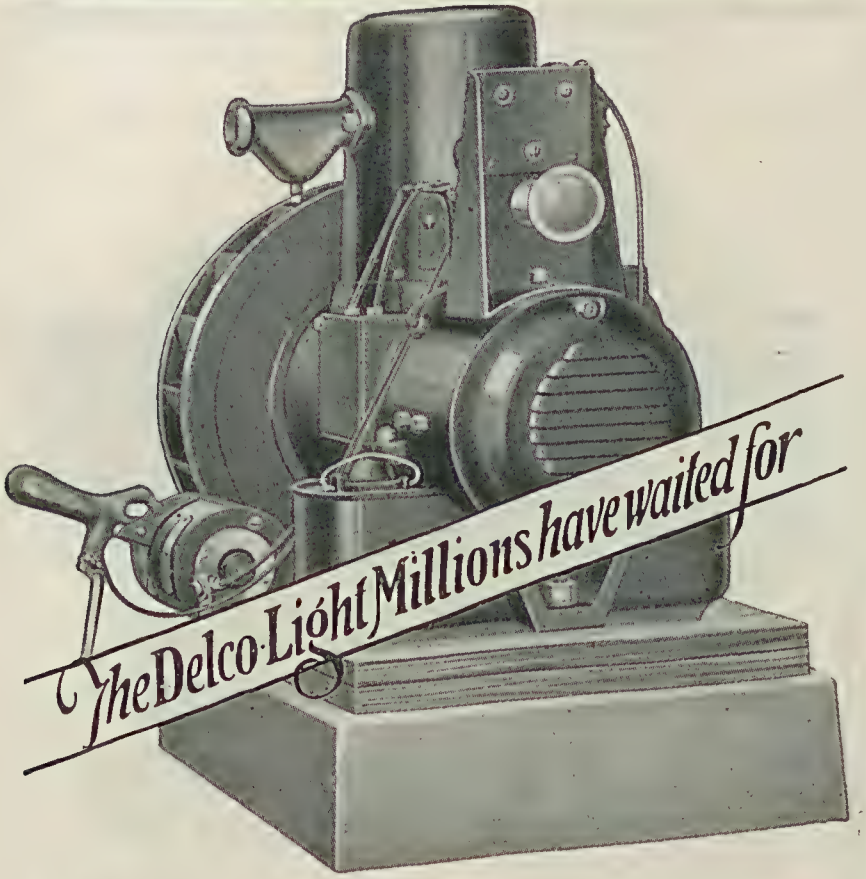

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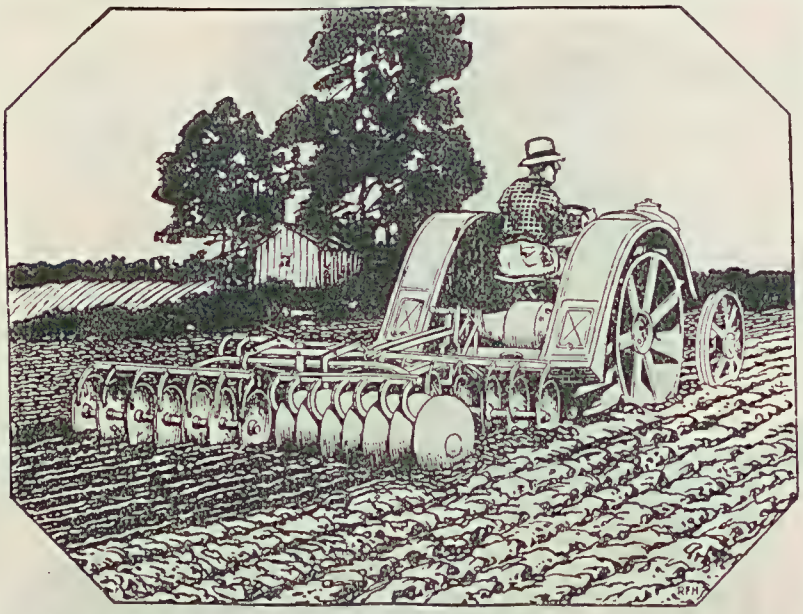

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EXPORTS SUPERINTENDENT, DEPARTMENT OF AGRICULTURE, PRODUCE OFFICES, 605-7 FLINDERS STREET, MELBOURNE.

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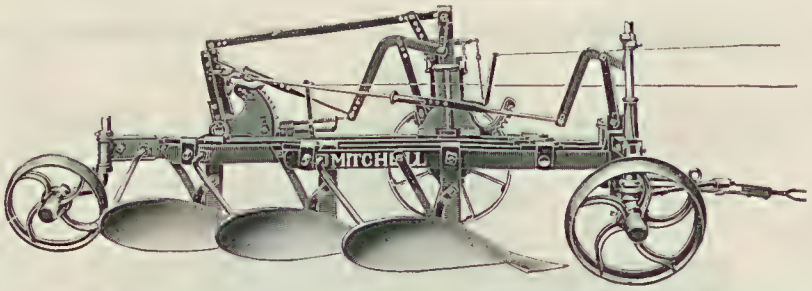
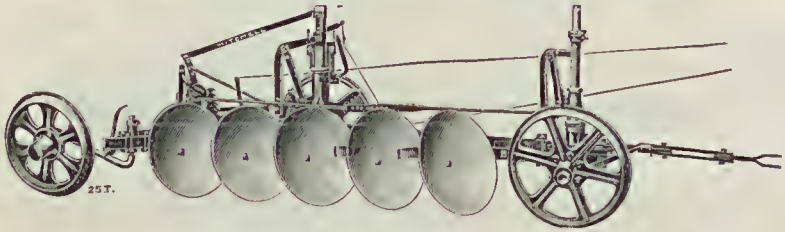


No. 61T. 3-Furrow Tractor Plow with Patent Power Lift (Supplied with Knife or Circular Coulters)



No. 25T. 5-Furrow Disc Tractor Plow with Patent Power Lift. All sizes made.
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DEPARTMENT OF AGRICULTURE, VICTORIA

FRIESIANS FOR SALE

(1) BULL "VICTORIA TOPNOTE" *ex* DOMINION HYACINTH (374)

Dropped 29th August, 1923

Sire: **Victoria Songboy (359)** by Dominion Domino Dutch Boy (73).

Sire of Dam: **Oak de Kol 2nd Homestead Fobes** (imp. to N.Z. from America) (341 N.Z.F.H.B.).

Dominion Hyacinth's Record for 273 days under Government Herd Test—
11,512 lb. Milk, 479 lb. Butter Fat. Price, 40 guineas f.o.r. Werribee.

For Full Lactation Period—
13,898 lb. Milk, 589 lb. Butter Fat.

(2) Bull Victoria Patch Lad *ex* Victoria Oakdale Lassie (996)

Dropped 24th September, 1923

Sire: **Victoria Jo Patch (345)** by Longbeach Big Patch (515 N.Z.F.H.B.), *ex* Dominion Madrigal (371).

Sire of Dam: **Dominion Oakdale (342)** by Oak de Kol 2nd Homestead Fobes.

Her Dam, Dominion Proud Lassie's Record for 273 days under Government Herd Test—
11,336 lb. Milk, 3·42 Test, 387 lb. Butter Fat.
Price, 32 guineas f.o.r. Werribee.

For Full Lactation Period—
12,216 lb. Milk, 3·51 Test, 428 lb. Butter Fat.

(3) Bull Victoria Woodpatch *ex* Dominion Woodnymph (988)

Dropped November, 1923

Sire: **Victoria Jo Patch (345)** by Longbeach Big Patch (515 N.Z.F.H.B.), *ex* Dominion Madrigal (371).

Sire of Dam: **Woodcrest Jo** (imp. to N.Z. from America) (334 N.Z.F.H.B.).

Dam's Record for 273 days under Government Herd Test—
10,610 lb. Milk, 3·17 Test, 336 lb. Butter Fat.

For Full Lactation Period—
13,240 lb. Milk, 3·31 Test, 439 lb. Butter Fat.

The record of the dam—DOMINION MADRIGAL—of the sires "Victoria Songboy" and "Victoria Jo Patch" for 273 days under Government Herd Test is 11,373 lb. Milk, 3·93 Test, 448 lb. Butter Fat; and for Full Lactation Period 13,485 lb. Milk, 4·17 Test, 563 lb. Butter Fat. "DOMINION MADRIGAL" is a full sister to "DOMINION QUEEN MERCEDES," third cow of all breeds under Government Herd Test 1923, and Winner "Weekly Times" Butter Competition, Melbourne Royal Show 1923, and Champion Melbourne Royal Show 1923.
Price, 32 guineas f.o.r. Werribee.

(4) Bull Victoria Bellringer *ex* Victoria Dutchbelle (990)

Dropped October, 1924

Sire: **Victoria High Patch (537)** by Victoria Jo Patch (345).

Sire of Dam: **Dominion Domino Dutch Boy (73)** by Longbeach Primrose League (698 N.Z.).

Dam's Record for 273 days under Government Herd Test—
8,768 lb. Milk, 314 lb. Butter Fat, 358 lb. Commercial Butter.
Price, 22 guineas f.o.r. Werribee.

(5) Bull Victoria Bridegroom *ex* Victoria Wedding Bell (999)

Dropped 18th September, 1924

Sire: **Burnbank Inka Segia Pietje (402)** by Alderley Segis Beets (imp.) (187).

Sire of Dam: **Victoria Milkman Jo (344)** by Woodcrest Jo (imp.) (344 N.Z.).

Dam's Record for 273 days under Government Herd Test: First Lactation Period—
6,838 lb. Milk, 3·50 Test, 239 lb. Butter Fat.
Price, 15 guineas f.o.r. Werribee.

G. Dam, DOMINION BELLE CORONA'S record for 273 days under Government Test—10,799 lb. Milk, 382 lb. Butter Fat, 436 lb. Commerical Butter. For Full Lactation Period—14,027 lb. Milk, 513 lb. Butter Fat, 585 lb. Commercial Butter.

Inspection of above Bull Calves at the State Research Farm, Werribee, is invited.

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DEPARTMENT OF AGRICULTURE, VICTORIA

Red Poll Dairy Herd

The Department has now completed the orders for calves that were booked ahead of calving when the advertisement was withdrawn; consequently the booking of orders for bull calves from the forthcoming calvings has now been resumed.

BULL CALVES are sold for delivery at a month old at prices based approximately on the actual milk and butter fat record of the dam at the rate of 1s. per lb. of butter *fat* yielded. Thus a calf from a cow with a 400 lb. butter fat record is sold for 20 guineas, one from a 300 lb. butter fat cow for 15 guineas, and so on. Bull Calves *ex* heifers on their first calf are sold for a set price of 10 guineas.

(For Record of Yields of dams see Red Poll Herd Book.)

VICTORIA VOLCANO (322 A.)

Sire: Nicotine (69 A.A.) by Acton Dewstone (imp.) 9524 (4 A.A.).
Dam: Tonga (253 A.) by Honingham Archbishop (imp.) 9702 (48 A.A.).

Tonga's butter fat yields for 6 successive lactation periods are as follow:—1916, 341 lb.; 1917, 398 lb.; 1918, 419 lb.; 1919, 479 lb.; 1920, 428 lb.; 1921, 562 lb.

BELLIGERENT (Imported) 11096 (8 A.A.)

Dam's Record (1st milking) 7144 lb. milk.

Dam's Dam's	,,	14533 lb.	milk	...	4	years	average	12871 lb.	milk.
Sire's Dam's	,,	10370	,,	...	7	,,	,,	9354	,,
Sire's D. Dam's	,,	9510	,,	...	12	,,	,,	8033	,,
G. Sire's D. Dam's	,,	10215	,,	...	7	,,	,,	9386	,,
G.G. Sire's D. Dam's	,,	12565	,,	...	10	,,	,,	8853	,,
G.G.G. Sire's D. Dam's	,,	10088	,,	...	2	,,	,,	9754	,,

BIT O' 'BACCA (Vol. 3)

Sire: Nicotine (69 A.A.) by Acton Dewstone (imp.) 9524 (4 A.A.).
Dam: Nictitana (311 B.) by Nicotine (69 A.A.).

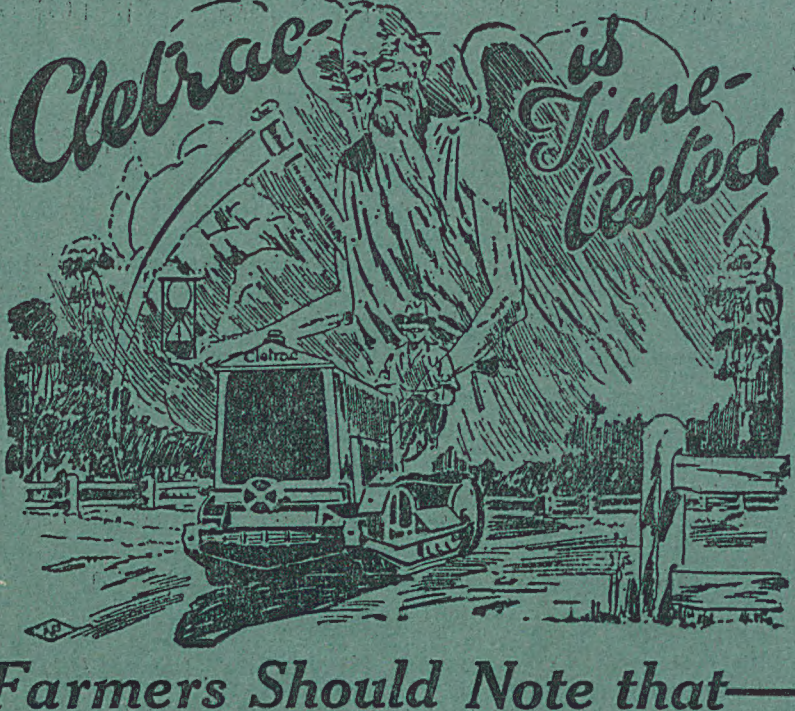
Nictitana's butter fat records for 6 successive lactation periods are as follow:—1918, 450 lb.; 1919, 396 lb.; 1920, 393 lb.; 1921, 465 lb.; 1922, 524 lb.; 1923, 536 lb.

Inspection of the Herd is Invited.

Visitors will be met at the Station on notifying the Manager, State Research Farm, Werribee.

Application for purchase to

Dr. S. S. CAMERON, DIRECTOR OF AGRICULTURE, MELBOURNE.



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